DEPARTMENT OF AGRICULTURE APPROPRIATIONS FOR 1954

HEARINGS

BEFORE THE

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

EIGHTY-THIRD CONGRESS

FIRST SESSION

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SUBCOMMITTEE ON AGRICULTURE APPROPRIATIONS

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FRED MARSHALL, Minnesota

ROSS P. POPE, *Executive Secretary to the Subcommittee*

PART 2

Agricultural Research Administration

Printed for the use of the Committee on Appropriations

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UNITED STATES
GOVERNMENT PRINTING OFFICE
30505 WASHINGTON : 1953

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DEPARTMENT OF AGRICULTURE APPROPRIATIONS FOR 1954

MONDAY, MARCH 2, 1953.

AGRICULTURAL RESEARCH ADMINISTRATION

WITNESSES

DR. B. T. SHAW, RESEARCH ADMINISTRATOR
F. H. SPENCER, ASSISTANT ADMINISTRATOR
E. L. STRUTTMANN, BUDGETARY AND FISCAL OFFICER
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE
JOSEPH C. WHEELER, DEPUTY DIRECTOR, OFFICE OF BUDGET AND FINANCE, DEPARTMENT OF AGRICULTURE

Mr. ANDERSEN. Before we have a general statement from you, Dr. Shaw, we will insert page 64 of the justification at this point.

(The material referred to is as follows:)

PURPOSE STATEMENT

The Agricultural Research Administration was established by the Secretary of Agriculture on December 13, 1941. This action was confirmed by Executive Order 9069, issued February 23, 1942. The organization was continued without change under Reorganization Plan No. 1 of 1947. It is composed of the following units:

Office of Administrator (including the Agricultural Research Center)
Office of Experiment Stations
Bureau of Human Nutrition and Home Economics
Bureau of Animal Industry
Bureau of Dairy Industry
Bureau of Agricultural and Industrial Chemistry
Bureau of Plant Industry, Soils, and Agricultural Engineering
Bureau of Entomology and Plant Quarantine

Through these agencies the Administration carries on most of the Department's research in the physical and biological sciences. It operates the 12,000-acre Agricultural Research Center at Beltsville, Md., where numerous research projects of the Department's bureaus, including some bureaus outside the Agricultural Research Administration, are being conducted. Much of the Administration's research is conducted in cooperation with the State agricultural experiment stations and with other research agencies, both public and private.

The Administration also conducts those control and regulatory programs of the Department which involve enforcement of plant and animal quarantines, meat inspection, and the control of diseases and insect pests of animals and plants.

The Administration is responsible for the program of Federal-grant funds made available to the States for the operation of agricultural experiment stations and for the coordination and integration of research work under way in the Department with that of the State agricultural experiment stations.

A more detailed discussion of work performed is included in the statements prepared by the individual bureaus of the Administration.

Mr. ANDERSEN. Now, do you have a general statement you would like to make? If so, the subcommittee will be very glad to hear you.

General Statement

Dr. Shaw. In agricultural research, the work that we are doing today can be expected to pay dividends in terms of farming practice next year, 5 years, and 10 years in the future. Therefore, in considering the needs for agricultural research, it is necessary for us to consider tomorrow's problems as well as those of today.

LOOKING AHEAD TO 1975

You will recall that last year in our hearing we discussed the size of the job ahead of agriculture in the next twenty-odd years and came to the conclusion that if we were going to provide the population that we would expect to have in 1975 with diets like we currently have in this country, with yields per acre that we are now getting, it would take around 115 million more acres of land than we now have for producing agricultural products. When we made due allowances for land released from feeding horses and mules of about 15 million acres and about 30 million acres probably coming in from reclamation, irrigation, drainage, land clearing, and so forth, we would still lack some 70 million acres of having enough land to provide for the expected population in 1975 at current diet levels.

Then, we compared that job ahead with the kind of progress that we had made recently in agriculture. From 1935 up to the present time, we have made enough improvements through all of our efforts in agriculture—research, extension, conservation, farmers adopting the new practices—everything we have done, to be equivalent to about 64 million acres of land. In other words, this job that we have ahead of us in the next twenty-odd years is just about the size of the job that we have accomplished in the period from 1935 to the present time.

ANALYSIS OF AGRICULTURAL PROGRAM

Now, with that as factual background, it seemed to me that it would be highly desirable to try to analyze whether or not we are turning out new findings in agricultural research at a rate that can be expected to produce that increased improvement in agriculture as we will need it. That is the particular thing that I would like to discuss with you today. I have a few charts that I would like to use.

Mr. Andersen. You had very interesting charts last year, I recall, Doctor. We will be glad to have you discuss these again. I wish, when you do that, you will remember you are talking for the record and will make it full enough so that the people reading the record can understand what is on the chart.

Dr. Shaw. Yes, sir; with your permission, in terms of the record, I have some tables that will simplify some of these data.

Mr. Andersen. That will be fine, anyway you want to present it.

PROGRESS MADE THROUGH RESEARCH PROGRAM

Dr. SHAW. The first thing I thought we ought to look at in terms of whether we are turning out practices in line with our needs is to review the progress that we have made. I have in this table a comparison of the productivity of principal agriculture commodities in 1935–39 and in the recent 5-year period, 1947–51.

(The table referred to follows:)

Changes in productivity rates 1935–39 to 1947–51: Principal agricultural commodities, United States averages

Commodity	Unit	1935–39	1947–51	Percent change 1935–39
Crops (average yield per acre):				
Corn, all	Bushels	25.0	36.5	46
Wheat, all	do	13.2	16.6	26
Potatoes, white	do	117.5	228.9	95
Tobacco, all	Pounds	882.5	1,235.2	40
Cotton, lint	do	225.6	280.1	24
Rice	do	2,234.0	2,203.6	−1
Soybeans, for beans	Bushels	18.1	20.6	14
Beans, dry edible	Pounds	856.0	1,105.0	29
Sugar beets for sugar	Tons	11.5	14.5	26
Livestock:				
Milk production per cow: Dairy cows	Pounds	4,403	5,192	18
Eggs per layer, Jan. 1: Poultry	Eggs	100	137	37
Pork production per sow farrowed: Swine	Pounds	1,270	1,415	11
Indexes:				
Crop yields per harvested acre		100	132	32
Livestock production per breeding unit		100	117	17

Dr. SHAW. You will notice that corn yields per acre have gone up 46 percent, wheat is up 26 percent, potatoes are up 95 percent, cotton 24 percent, soybeans 14 percent, and sugar beets for sugar 26 percent. Milk production per cow is up 18 percent, and eggs per layer are up 37 percent; pork production per sow farrowed is up 11 percent. If you combine all of the crops and livestock into single figures, crop yields per acre for all crops in the United States are up 32 percent, and livestock production per breeding unit is up 17 percent.

Those percentage increases have made up this equivalent of 64 million acres of agricultural improvement that we have mentioned. Now, I think it is important to compare this recent progress with progress over a longer period of time.

EGG PRODUCTION PER LAYER—UNITED STATES AVERAGE

In this chart (fig. 1), there is reflected United States average egg production per hen from 1909 to 1951.

(The chart referred to follows:)

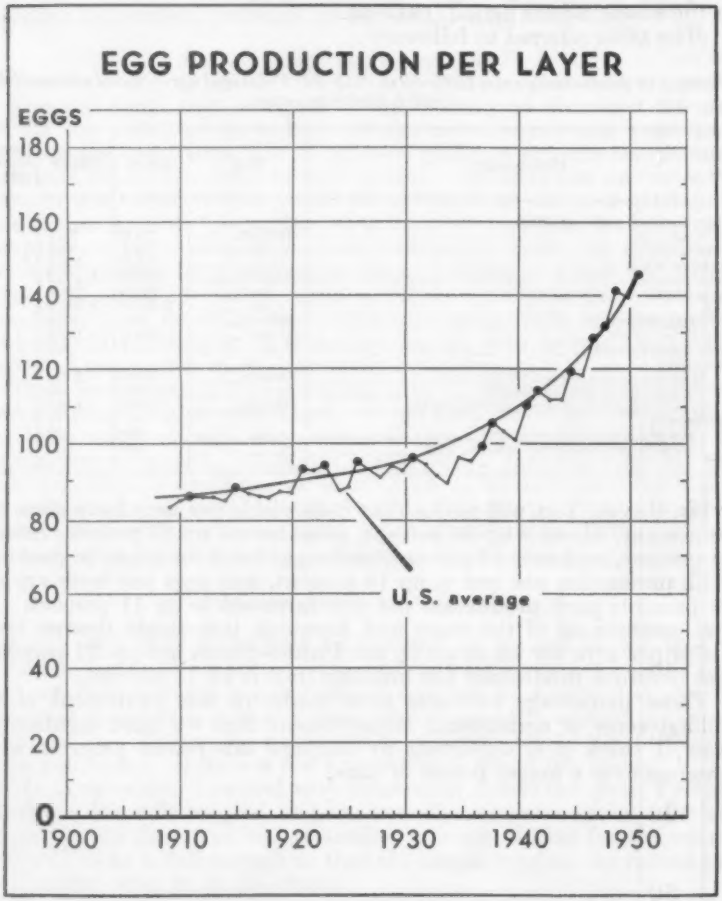


FIGURE 1.

Dr. SHAW. You will observe that there was some progress prior to 1935, but the major progress has been since 1935. In other words, we went from a little better than 80 eggs per hen to about 100 by 1935. But then we have increased that to 145 since.

On other commodities, the curves would not be exactly like this, but this is generally the picture we have in agriculture. We have a little better than held our own up to about 1935 and it has been since 1935 that we have made these rather tremendous increases in output per acre or per animal unit.

FUTURE TRENDS

If we consider merely what has happened in the past from the table that I have shown and this graph on egg production per hen, we would be inclined to be optimistic as to the future. If these increases can be continued at the rate we have been getting them, then certainly we will have adequate supplies in the years ahead.

How can we determine whether those will go on or not? It seemed to me that if by some means we could calculate what production could have been year by year, had you used all the information that was known at that time, that I could then tell whether research is maintaining its lead over practice; whether practice is catching up with research, or whether research is extending its lead. I have attempted to show that in this next chart (fig. 2).

(The chart referred to follows:)

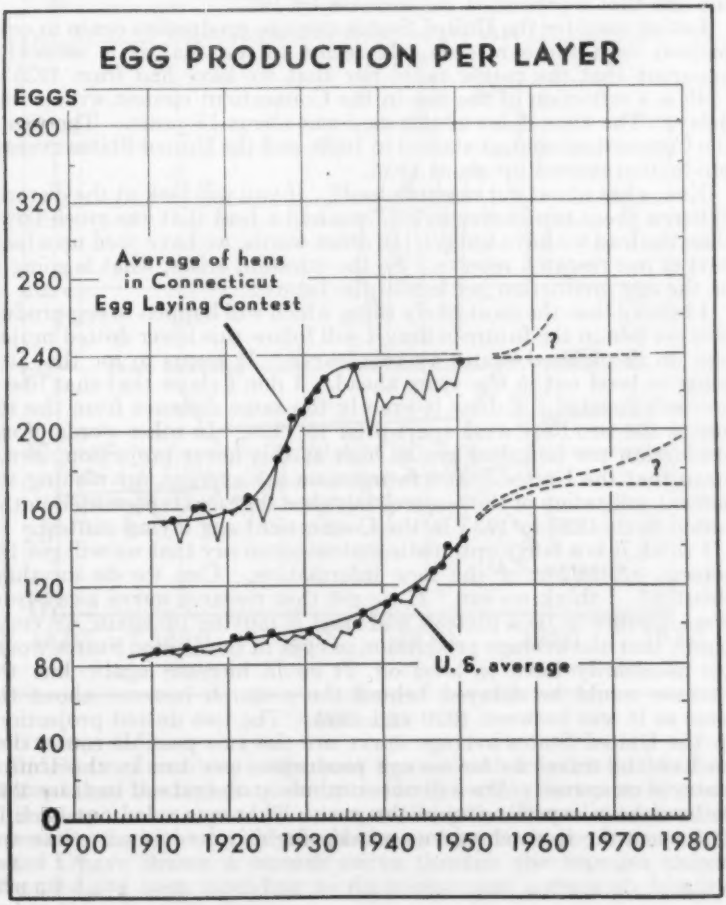


FIGURE 2.

Dr. SHAW. In the case of egg production per hen, I used as a measurement of what production could have been if you had used the known information to the fullest extent, the average of hens in the Connecticut egg-laying contest. Hens in this contest are shipped in from all over the country. The object of the contest is to break records. You would assume that these fellows were getting on to the new information about as rapidly as you could expect. Notice what happened. Starting in about 1920 and going up to about 1935, there was a marked increase in the average egg production of the hens in the Connecticut egg-laying contest. But since 1935 the frontier has not been extended. Now you would expect that if there were new information to be obtained, these fellows would be using it. You see another thing in this chart and that is that it is hard to hold production at these higher levels. For a good many of these years, production has been down below the line that represented the increase by 1937.

Let us consider the United States average production again in comparison with those records. It seems to me that it is somewhat apparent that the rather rapid rise that we have had from 1935 to 1949 is a reflection of the rise in the Connecticut contest with a time delay. The time delay in this case was about 15 years. The rise in the Connecticut contest started in 1920, and the United States average production started up about 1935.

Now what about our research lead? If you will look at the distance between these two curves in 1935, we had a lead that was much larger than the lead we have today. In other words, we have used up a large part of our research reserve. So the question arises, what is going to be the egg production per hen in the future?

I believe that the most likely thing which will happen to egg production per hen in the future is that it will follow this lower dotted projection on the United States average curve. It seems to me that it is going to level out in the years ahead. I don't claim that that line is precisely located. I drew it exactly the same distance from the top line as the two lines were apart prior to 1920. In other words, if egg production per hen does get as high as this lower projection, it will mean that the United States farmers, on the average, are making 100 percent utilization of the research advance that was represented in this period from 1920 to 1935 in the Connecticut egg laying contest.

I think it is a fairly optimistic statement to say that we will get 100 percent utilization of the new information. Can we do anything about it? I think we can. If we get that research curve away from what appears to be a plateau and start it moving up again, we could expect that the average production of eggs in the United States would not necessarily have to level off. It could increase again, but the increase would be delayed behind the research increase about the same as it was between 1920 and 1935. The two dotted projections on the United States average curve are the two possible routes that we have to travel as far as egg production per hen in the United States is concerned. We will not continue at the rate of increase that we have been experiencing in the past. That was ruled out back in 1935 when the research curve ceased going up.

CORN PRODUCTION PER ACRE

Is that a unique situation for egg production per hen or do we have other similar examples? I would like to consider the case of corn production per acre, as shown in the next chart (fig. 3).

(The chart referred to is as follows:)

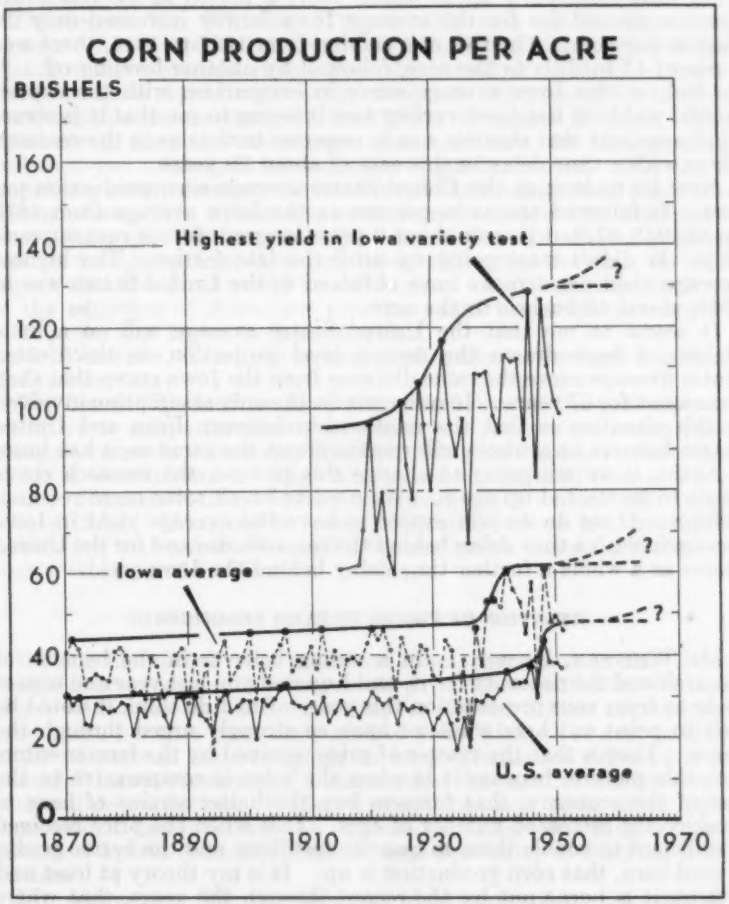


FIGURE 3.

Dr. SHAW. In order to represent the research frontier in this case, I have taken the highest yield in the Iowa variety test year by year. This is experimental production on small plots. The solid broken line represents the highest yield obtained year by year in the Iowa variety test. I have drawn a smooth curve through the topmost points. What I have been intending to do is represent a research frontier,

the farthest point out in our knowledge. You will notice that the curve did go up rather rapidly beginning about 1920, but it seems to be leveling off.

Let us look at the Iowa average production of corn per acre. The dashed broken line in this case represents the average yield of corn in Iowa year by year from 1870 up to the present time. You will observe that from 1870 up to about 1937, a period of 67 years, the frontier possibilities for the average Iowa farmer increased only 2½ bushels per acre. Then all of a sudden from 1937 to 1944, there was a rise of 15 bushels to the acre, followed by another leveling off. If we look at this Iowa average curve in comparison with the experimental yields in the Iowa variety test it seems to me that it is somewhat apparent that this rise was in response to the one in the research curve with a time delay in this case of about 20 years.

Now let us look at the United States average corn production per acre. It followed the same pattern as the Iowa average from 1870 up to 1935–37, but it took about 9 years longer before it rose appreciably. It didn't start going up until the late forties. The highest average yield per acre we have obtained in the United States was in 1948, about 43 bushels to the acre.

It seems to me that the United States average will go a little higher. I have drawn the dashed level projection on the United States average curve the same distance from the Iowa curve that they were apart for 67 years. In other words, the only assumption involved in this situation is that the relationship between Iowa and United States farmers as a whole will remain about the same as it has been.

Again, if we are going to change this picture, the research curve needs to be started up again. We need to break some more research ceilings. If we do we will expect to have the average yield in Iowa rise again with a time delay behind the research rise and for the United States as a whole a further time delay behind the Iowa yield.

RELATION OF PRICES TO FARM PRACTICES

Mr. WHITTEN. Doctor, I am a strong believer in the benefits of research and the necessity for it, and I quoted you last year and expect to do so from your presentation this year. But I do think it would be well to point out here what we have so strongly urged through the years. That is that the matter of price received by the farmer enters into this picture, because it is when the price is comparative to the rest of the economy, that farmers buy the better strains of hens to produce the increased number of eggs. It is when the price received is sufficient to enable them to buy the fertilizers and the better grades of seed corn, that corn production is up. It is my theory at least and I think it is borne out by the record through the years, that where the farmer sells on an unprotected market in periods of low consumption we place the greatest drain on our soil fertility. We have had much less production than the soil really would have made if the farmer had had the money to put in it for proper fertilizer, rotation, and so forth.

As evidence of what this means, I received not less than 2 weeks ago a report on a broad section of the trade in the manufacture, distribution and sale of fertilizers. This time last year they had sold 40 percent of their total year's sales. This year they have sold 8 percent

of last year's total sales. We know farm prices, prices received for farm products are down. The minute the price goes down, apparently, farmers start reducing or doing without fertilizer and your production levels off or falls back per acre. So while this doesn't detract from your point that research is highly needed, this matter of price received is going to seriously enter into the followup on what your research shows is possible.

Dr. SHAW. Mr. Whitten, I agree with your observations completely. I had expected to treat that point in my summary, but now that you have brought it up, from the period of 1935–39 where we have had these rapid rises, you are absolutely right that price has been the thing that has encouraged the adoption of research findings. Now, you have to have the two things: you must have the idea to adopt and then you must have an incentive to get it adopted. We can do something about these curves in terms of the average yield other than through research. Better educational methods could be expected to narrow this gap. If we could have prices for agricultural products relative to other prices, that were better than what they are, we could expect that this level would be still higher. And I am sure, in terms of the adoption of these new practices, that prices are perhaps the most important factor in their adoption.

Mr. WHITTEN. You have to keep getting answers to have something else to adopt.

Dr. SHAW. We had to have this possibility of rise, then some incentive to adopt the improved practices. As you say, with prices going down as they are today, the only thing that can happen to these yields is to come down. That has been demonstrated over and over again. Farmers will be trying to reduce costs wherever they can reduce them. Certainly in terms of fertilizer there is a very good correlation between the farmers' previous year's income and the next year's purchase of fertilizer.

IMPORTANCE OF SOIL CARE AND EDUCATION

I would like to call your attention to another point on this United States average curve in reference to your statement, Mr. Whitten. If you will notice on the broken line for United States average corn production per acre from the period of about 1906 clear over to about 1936, we were on the downgrade as far as production per acre in the United States is concerned. I am satisfied that decline was associated with soil deterioration. We have raised that now to a point higher than we ever had it before with increased fertilizers and with the possibilities of hybrid corn, and there is some possibility of carrying it still further.

Mr. ANDERSEN. The development of hybrids, of course, gave it a big boost, did it not, Doctor?

Dr. SHAW. The hybrids provided the possibilities of the boost and then with associated management practices, including the use of more fertilizers along with the hybrids, we were able to achieve the 15-bushel increase.

Mr. ANDERSEN. You mentioned one thing, before we leave this particular chart, that perhaps as time goes on educational work will lessen the spread between the Iowa average line and the experimental line. I think you are absolutely right that in egg production or any

production, general knowledge will get to such a point as to bring those lines closer together.

Dr. SHAW. As we do a better job of getting that information out to the farmer, we ought to be able to narrow these gaps. It is obvious, however, that when we didn't have the new idea, progress was slow.

Mr. ANDERSEN. That is correct.

Dr. SHAW. When we have the new idea, it can be rapid.

Mr. HUNTER. Dr. Shaw, how do you account for the fact that Iowa is about 10 years ahead of the national average as far as the rather sudden and marked increase in corn production is concerned?

Dr. SHAW. The first successful hybrid that we developed in the United States was at the Connecticut Agricultural Experiment Station. That was in 1917. At that time, research men knew hybrid corn was coming for the United States, but that was on one experimental plot and we only had the one double cross hybrid.

It was necessary to develop hybrids adapted to the soil and climatic conditions of every one of the States. The Corn Belt was the first to take it up because corn was so important to them. The experiment stations in the Corn Belt and the United States Department of Agriculture really went to work on that problem in earnest. The kind of curve that I show for Iowa would be about the same as you would have in any of the other Corn Belt States. They were out in front. Then as you moved into areas where corn was relatively less important in the total economy, farmers were slower taking it up. About 80 percent of the farmers in the Nation are now using hybrids. Corn is not as important in some areas as it is in the Corn Belt and, therefore, some farmers haven't yet adopted the use of hybrids.

Mr. WHITTEN. It is only in the last 6 or 8 years you have had a successful hybrid for the Southern States. It took a long time to ever come up with a hybrid that was adapted for that area.

Dr. SHAW. Yes, it has been only since 1945 that we have had hybrids and the practices to go along with them for the South. We are now already getting some significant increases in corn production in that area.

PORK PRODUCTION PER HUNDRED POUNDS OF FEED

The next chart I have (fig. 4) concerns pork production per hundred pounds of feed.

(The chart referred to follows:)

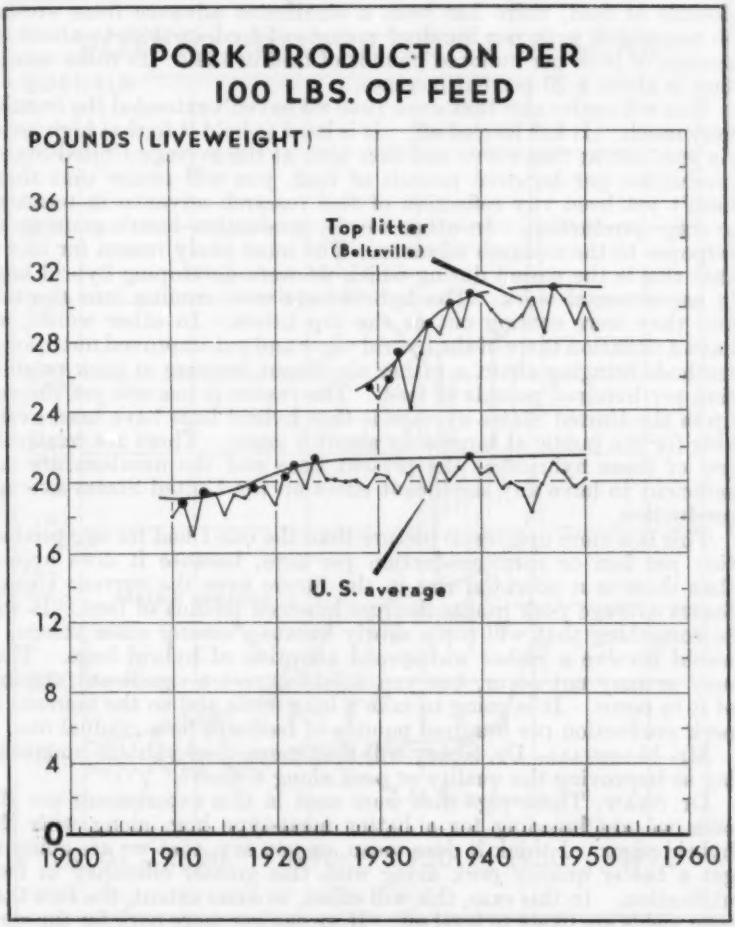


FIGURE 4.

Dr. SHAW. To represent a research frontier in this case, I have used our experimental work at Beltsville where we have a record-of-performance feeding test going on year by year. We use 50 litters of pigs in the test and I have taken the top litter in that test each year to represent the research frontier. You will notice that in the production of the top litter, in terms of pounds of pork per hundred pounds of feed, there has been a significant advance from around 26 pounds of pork per hundred pounds of feed in 1930 to about 31 pounds of pork per hundred pounds of feed in 1940. In other words, that is about a 20-percent increase.

You will notice also that since 1940 we haven't extended the frontier very much. It has leveled off. It is hard to hold it to that high level. As you look at that curve and then look at the average United States production per hundred pounds of feed, you will notice that there hasn't yet been any reflection of this research advance in terms of average production. In other words, production hasn't gone up in response to the research advance. The most likely reason for this is that this is the period during which we were developing hybrid hogs in experimental work. The hybrid hogs were coming into the test and they were coming out as the top litters. In other words, we have a situation there of the hybrid vigor and our improved nutritional methods bringing about a rather significant increase in pork production per hundred pounds of feed. The reason it has not yet showed up in the United States average is that hybrid hogs have been available for the public at large only about 3 years. There are relatively few of these hybrids at the present time and the numbers are not sufficient to have any significant effect on the United States average production.

This is a more optimistic picture than the one I had for egg production per hen or corn production per acre, because it does appear that there is a potential rise in the future over the current United States average pork production per hundred pounds of feed. It will be something that will come slowly because, among other things, it would involve a rather widespread adoption of hybrid hogs. That may or may not occur, but you would expect a significant amount of it to occur. It is going to take a long while and so the increase in pork production per hundred pounds of feed will be a gradual one.

Mr. MARSHALL. Dr. Shaw, will that mean that you are maintaining or improving the quality of pork along with it?

Dr. SHAW. These pigs that were used in this experiement are the ones we are breeding for a better meat-type hog, along with the hybrid vigor. I think it does mean, as you say, that we are going to get a better quality pork along with this greater efficiency in feed utilization. In this case, this will offset, to some extent, the fact that corn yields are likely to level off. If we can get more pork for the corn we have; the one will offset the other somewhat.

POTATO PRODUCTION PER ACRE

The next chart (fig. 5) is on potato production per acre. It is a rather interesting one.

(The chart referred to is as follows:)

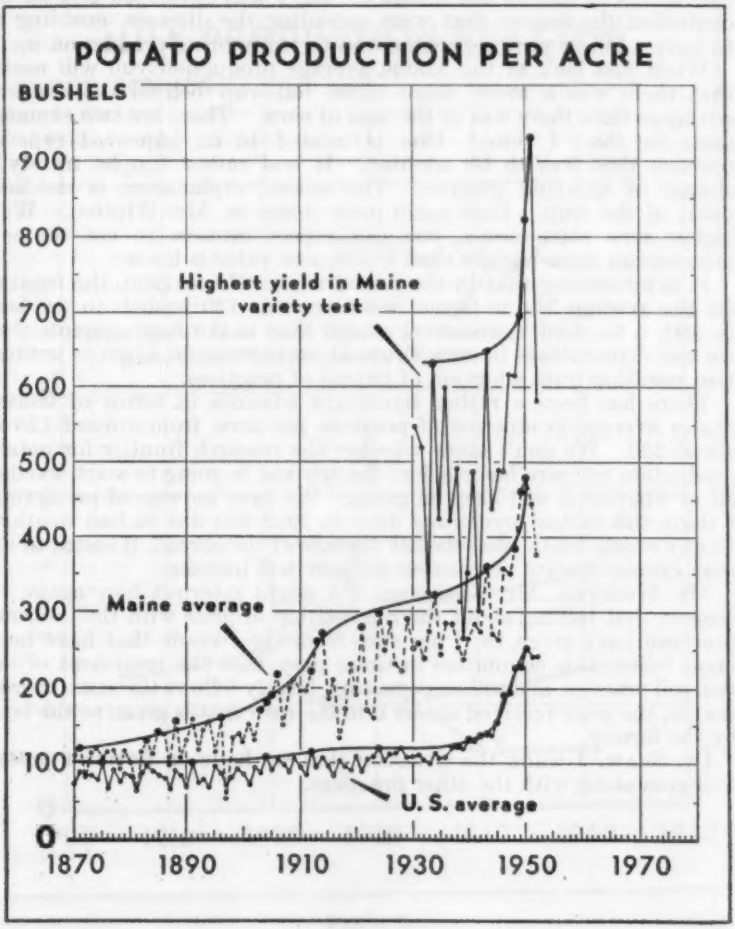


FIGURE 5.

Dr. SHAW. I have in this case represented the research frontier by the highest yield in the Maine variety test year by year. You will notice that it has really gone up in recent years. In 1943 it was around 650 bushels of potatoes per acre, and in 1951 it was up to 940 bushels per acre. Now, the reason for this rise was primarily the control of insects and diseases. DDT was developed and its use controlled the insects that were spreading the diseases, enabling us to have a longer growing season and to really bring production up.

When you look at the Maine average production you will notice that there was a much more rapid followup behind the research advances than there was in the case of corn. There are two explanations for that, I think. One is related to an improved type of practice that was to be adopted. It was rather simple, merely a change of spraying practice. The second explanation is the acre value of the crop. Here again price comes in, Mr. Whitten. With higher acre value crops, you can expect farmers to use the new information more rapidly than where acre value is lower.

It is interesting that in the period from 1870 to 1950, the frontier for the average Maine farmer went up from 120 bushels to the acre to 480, a fourfold increase. Perhaps that is the best example that we can demonstrate in agriculture of an increase in average production resulting from adoption of improved practices.

There has been a rather significant advance in terms of United States average production of potatoes per acre, from around 120 to about 250. We don't know whether the research frontier for potato production per acre has reached the top and is going to start leveling off or whether it will keep on going. We have no way of predicting. I think this rather precipitate drop in 1952 was due to bad weather. In any event, when you consider the size of the spread, it seems to me that average potato production per acre will increase.

Mr. WHITTEN. Mr. Chairman, if I might interject here again. I suspect that talking about the relationship of price with the information you have given us, I am sure from the records that have been made before this committee in times past, that the treatment of the soil, soil practice, and soil conservation, largely follows the same course, that is, the price received enters into the care that is given to the land by the farmer.

Dr. SHAW. I think the situation that we have on fertilizer pretty well goes along with the other practices.

MILK PRODUCTION PER COW

My next chart (fig. 6) is for milk production per cow.
(The chart referred to is as follows:)

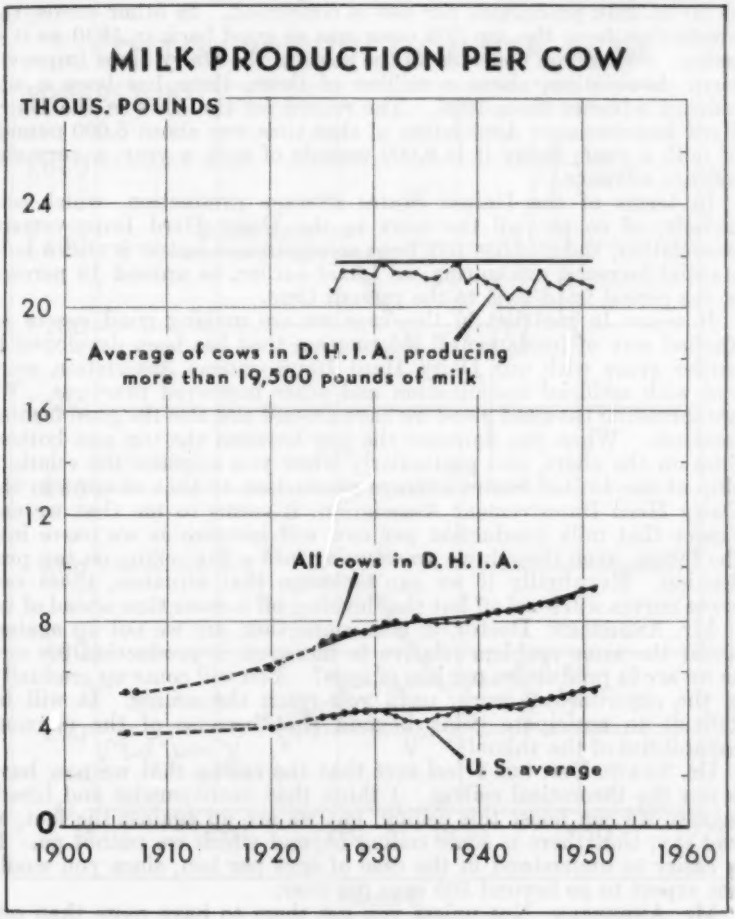


FIGURE 6.

Dr. SHAW. In order to get what a frontier might be in this case, I took the average of the cows in the Dairy Herd Improvement Association producing more than 19,500 pounds of milk a year. This would be equivalent to about the top 300 cows in the Nation. You will observe that we have not broken any ceilings in the last 25 years as far as milk production per cow is concerned. In other words, the production from the top 300 cows was as good back in 1930 as it is today. When you consider all the cows in the Dairy Herd Improvement Association, about a million of them, there has been a significant advance since 1906. The record for the cows in the Dairy Herd Improvement Association at that time was about 5,000 pounds of milk a year; today it is 9,000 pounds of milk a year, a very significant advance.

In terms of the United States average production, which will include, of course, all the cows in the Dairy Herd Improvement Association, the rise has not been so significant but it is still a substantial increase, amounting, as I said earlier, to around 18 percent in the period from 1935 to the present time.

It seems to me that in this case we are making good use in an applied way of fundamental information that has been developed in earlier years with our Dairy Herd Improvement Association work and with artificial insemination and other improved practices. We are spreading the good blood we have around and also the good feeding methods. When you consider the gap between the top and bottom lines on the chart, and particularly when you consider the relationship of the United States average production to that of cows in the Dairy Herd Improvement Association, it seems to me that we can expect that milk production per cow will increase as we move into the future, even though we are running into a flat ceiling on top production. Eventually if we can't change that situaton, these two lower curves will level off but that leveling off is some time ahead of us.

Mr. ANDERSEN. Doctor, in this connection, are we not up against about the same problem relative to increases in production per cow as we are in production per hen of eggs? You will come up gradually in the experimental work, until you reach the ceiling. It will be difficult to anticipate going beyond that because of the physical capabilities of the animal?

Dr. SHAW. Yes, but I feel sure that the ceiling that we now have is not the theoretical ceiling. I think that nutritionwise and breedingwise we can boost this ceiling, but we are up against the fact, as you say, that there is some ceiling beyond which we cannot go. It is easier to understand in the case of eggs per hen, since you would not expect to go beyond 365 eggs per year.

Mr. ANDERSEN. Not unless you get them to have more than one egg a day.

Dr. SHAW. But there is some ceiling beyond which we could not push through.

Mr. ANDERSEN. Before we leave that milk-production chart, the big thing we are aiming at is to keep that lower line progressing upward as long as possible, is it not?

Dr. SHAW. Yes. And the various methods that we have—further application of the fundamental knowledge, better educational techniques and price—will all help to move that line up.

Mr. ANDERSEN. Because that lower line will indicate whether or not research pays off?

COTTON PRODUCTION PER ACRE

Dr. SHAW. Yes. The next chart (fig. 7) I have is for cotton.
(The chart referred to is as follows:)

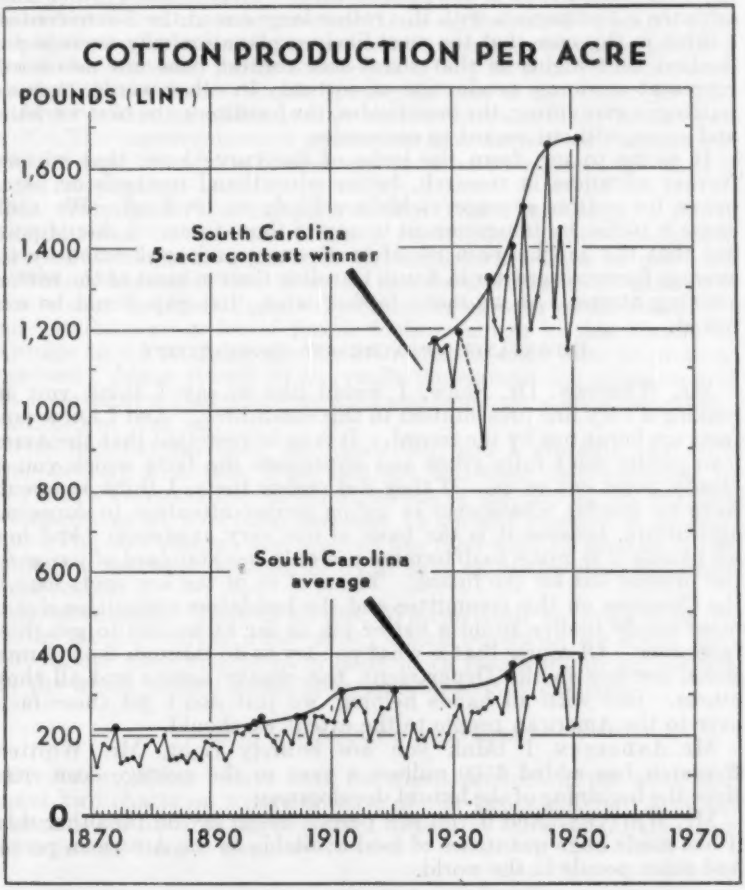


FIGURE 7.

Dr. SHAW. I selected South Carolina for the illustration of cotton production per acre since that State has had a 5-acre cotton-growing contest since 1926. It is a statewide contest in which they give a rather substantial cash prize for the State winner each year. In recent years, they have added to that State prize a sweepstakes prize. Whenever a record is obtained that is higher than any previous record, they give a sweepstakes prize that adds another cash incentive. With those incentives the top curve represents the record of the contest winner each year in South Carolina, starting before 1930, at around 1,200 pounds of lint per acre and going up very rapidly. In

1946, it was up to around 1,700 pounds and in 1951 it hasn't gone much higher. In other words this rise is leveling off, too. When you look at the average production of cotton in South Carolina, you will see that the average producer has increased his yield about a third in the period from 1930 to the present time. That seems a rather small advance in comparison with this rather large one in the 5-acre contest. I think in this case that the most likely explanation why average production isn't higher is that the 5-acre contest does not necessarily represent economic production of cotton. In other words, they are putting in everything, the insecticides, the fertilizers, the best varieties, and so on, without regard to economics.

It seems to me, from the looks of the curve here, that without further advances in research, better educational methods or better prices for cotton average yields are likely to level off. We could cause it to rise by improvement in any of these three. I should point out that the gap between research advances and application by the average farmer is greater in South Carolina than in most of the cotton-growing States. As we move farther west, that gap would be narrowed.

IMPORTANCE OF INCREASED PRODUCTIVITY

Mr. WHITTEN. Dr. Shaw, I would like to say I think you are making a very fine presentation to this committee. And I know your facts are borne out by the record. It is to be regretted that the American public can't fully grasp and appreciate the facts which you so clearly point out to us. If they did realize them, I think we would have no trouble whatsoever in giving proper attention to American agriculture, because it is the basis of our very existence. And how we handle it is going to determine not only our standard of living for the present but for the future. Those of us in the key spots here in the Congress on this committee and the legislative committee should more firmly resolve to do a better job so far as we can to get these facts over. Of course that is what you try to do through the informational services in the Department, the county agents and all these others. But with all hands helping, we just don't get these facts over to the American people to the extent we should.

Mr. ANDERSEN. I think you are entirely right, Mr. Whitten. Research has added $500 million a year to the average corn crop, since the beginning of the hybrid development.

Mr. WHITTEN. And if you will permit me to say on the other side, it has made huge quantities of food available to the American people and other people in the world.

Mr. ANDERSEN. If we don't continue this work, Mr. Whitten, we may be the sort of a nation that can't feed its own people.

Dr. SHAW. In regard to the point that you just made, Mr. Andersen, and the one Mr. Whitten was discussing, Director Sharp of California, in a meeting I attended back in December, was reporting on an analysis of the benefits of these improvements in agriculture and stated that he had seen calculations by an economist in whom he had confidence that if the American public today had to buy its food produced with practices that we had available in 1940, the cost to the Nation for food would have been $9 billion greater than what we actually had to pay for it. The improvements in production have been of such magnitude that the food bill of the Nation was reduced $9 billion over what it would have been.

Mr. ANDERSEN. The highlight of Mr. Well's testimony, I think, was to the effect that the laboring man today buys considerably more food of various types with his hourly wage than he did back in 1930, 1935, and 1939. That is merely a followup of what you have to say, that food is gradually becoming cheaper to the consumer. And yet there are a lot of people foolish enough in this Nation to begrudge to the producer the fair price that he must have to produce that food. Many people do not really understand the situation and this is certainly a field where we need and could use a lot of education.

Dr. SHAW. Yes, sir.

Over and beyond that, Mr. Andersen, and I am sure that you agree entirely with this, if we had not had these improvements in agriculture we could not have 85 percent of the population engaged in industry as we now have and only 15 percent engaged in agriculture. The fact that we can produce our food with 15 percent of the population makes it possible for us to have all of the other advances in the Nation.

Mr. ANDERSEN. That is correct. We can turn an extra 5 or 10 million people over to other work, which otherwise we could not. They would have had to have done more handwork in agriculture and the whole picture would have been materially changed.

WHEAT PRODUCTION PER ACRE

Dr. SHAW. Next, I have data for wheat production per acre, and I have two charts on wheat because of the vastly different growing conditions we have in the country. One is in the dryland area and one is in the humid areas.

This first illustration (fig. 8) is from the dryland area and it is from Thomas County, Kans.

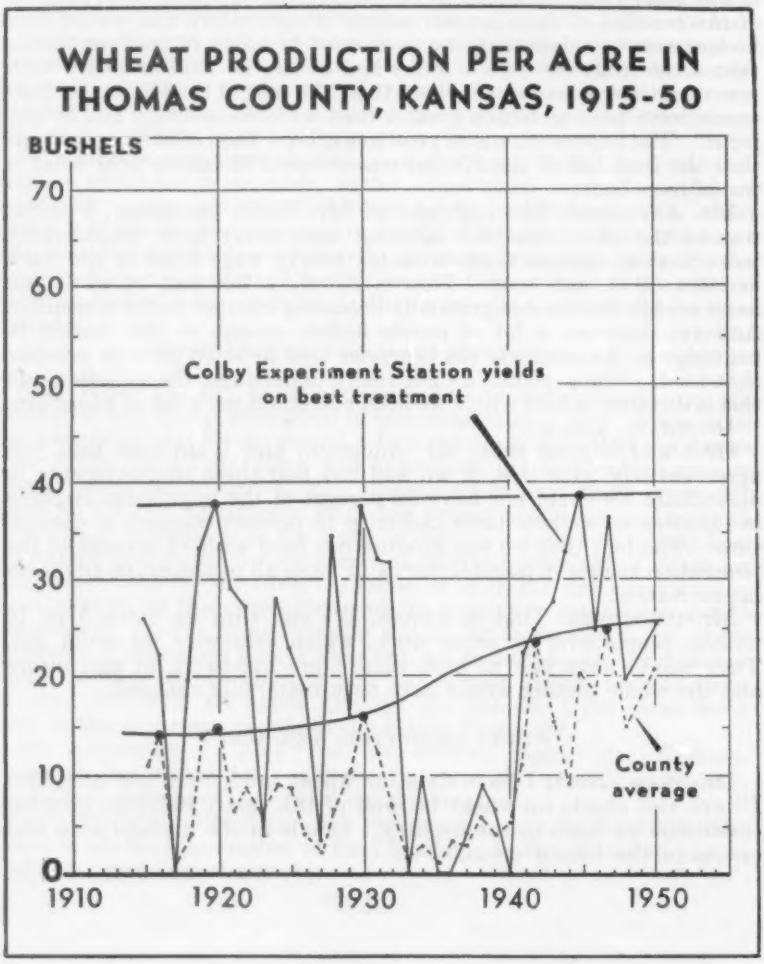


FIGURE 8.

Dr. SHAW. The research frontier is represented by the highest yield on our best treatment at the Colby Experiment Station in Kansas. You will observe, first of all, that there is violent fluctuation in the best that is possible in wheat yields on the plains. In other words, in the period that I have considered from 1915 to the present time, there were eight times when the yield of wheat on the best treatment on our experimental plots was less than 5 bushels to the acre. In some years the best yield that is possible is pretty close to zero. Now then, you observe also that we haven't broken a research ceiling in terms of wheat production per acre in the plains from about 1920 to the present time. Experimentally we were able to grow wheat as well back in 1920 as in 1950. We have introduced new varieties in this period. But what they have done has allowed us to hold our own. In other words, if we did not have the new varieties which are resistant to diseases that we have had to deal with, the average production on best plots would have gone down. I think this illustrates a point we should all remember in terms of agricultural research, The principal accomplishment of agricultural research in this Nation has been to hold yields where they are. Where you don't have it in other countries, you have had a deterioration of agriculture and yields have gone down. In my mind, the greatest significance of our research is that we have been able to hold our own. The increases we have are extra dividends.

As we look at the county average yields in Thomas County, Kans., it will be observed that in recent years the yields have risen over what they were in the period 1920–30. The reason that they have risen is that Thomas County farmers are now using information that was in use in the experimental plots back in 1920. The principal thing is moisture conservation. Fallowing is the primary practice that has brought these yields up. You can see that running into a ceiling on the research frontier that the most likely thing to have happen to yields of wheat in the plains is that they are going to level off.

My last chart (fig. 9) represents the more humid area of the United States.

(The chart referred to follows:)

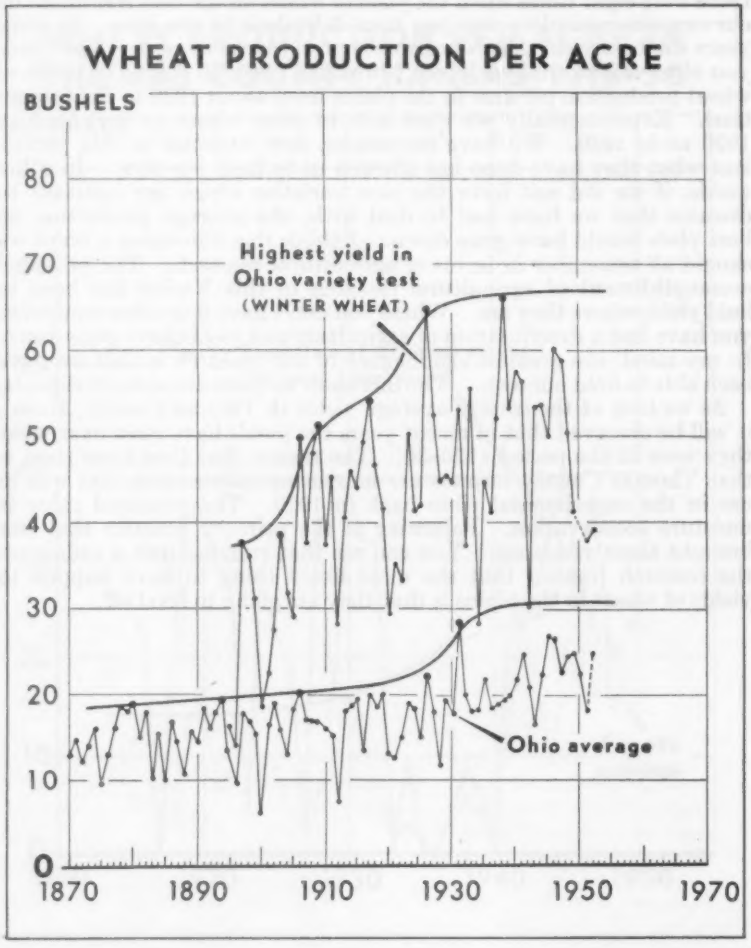


FIGURE 9.

I have used the highest yield in the Ohio winter wheat variety test to represent the research frontier since I had experimental data going back from 1895 to the present time. You will notice that we made rather significant advances in terms of boosting those yields. But since 1930 we have not extended the frontier very much. Now, as we look at the Ohio average production, we observe a small advance in

wheat-yield possibilities with the average farmer from 1870 up to about 1920. But the real rise came in the period from about 1940 to 1950. In other words, in response to the research advance between 1910 and 1930, wheat yields have been boosted.

Mr. ANDERSEN. Yes; and I think, Doctor, that universal use of tractors during that period of increase helped a lot. These farmers were able to do this fallowing that you talk about much more efficiently than before.

Dr. SHAW. And to do the various farm operations on time. Timing is of great significance in wheat production and in other crop production.

Mr. ANDERSEN. Have you any similar chart to show the production of wheat in irrigated areas by any chance? I suppose you eliminate those extreme cases.

Dr. SHAW. I am trying to get data of the character I have here State by State, so that I can show the differences. I do not have them at the present time, but I am working on it.

One of the things you would see is that they are starting to use fertilizers along with the water and are stepping up the yields in response to that.

RESEARCH FRONTIER AND ITS FUTURE

Now, I would like to sum up these charts which are representative of the general situation in agriculture. You will recall that in every single case except potatoes, the research frontier had either already leveled off or is rapidly approaching a leveling off stage. If that is the case, it seems to me that it is somewhat obvious that we can expect a leveling off in farm yields.

To be sure, as we mentioned earlier, with better educational methods or with better agricultural prices, we could move the average production closer to the experimental possibilities than we now have them. But we will have a difficult time taking the yields per acre of most crops much higher, unless we can start moving our research frontier up at a more rapid rate. I think that we can say definitely that we are using up our research faster than we are supplying new information. Personally, I do not think that is a good situation for the country to be in. I think in research we ought to be turning out new results as fast as the ones we have are being used up. If we do maintain that kind of a position as we move into the future, we would be ready for any emergency that may arise and we would be better prepared to feed the increased population that we will have.

I am sure none of us would have any worries in terms of the Nation's going hungry. There are many alternatives that we can turn to before that would be necessary. While we have stated that probably we can bring in around 30 more million acres of land between now and 1975, if economic and other conditions make it feasible there is still more land that could be brought in. We could turn, if we have to, to a greater use directly by the humans of vegetable products. But we are a meat-eating, milk-drinking, and egg-eating people. All of us want to maintain the kind of diets we have and improve them if possible. I think we do have some concern in terms of the increased population of maintaining the kind of diets we now have.

I don't think any of the facts that I have presented would indicate that we need worry about increased production, say, for the next 10 years, but I do think that from 10 years on, we have some worries. As you have noticed on my charts, once we develop a fundamental finding, it takes some 10 or 15 years, sometimes 20 years, to get it adapted to the average farm. If we are going to have results available 10, 15, and 20 years from now, we must move the research frontier at a faster rate than we are doing it.

Mr. ANDERSEN. Thank you, Doctor, for a very splendid statement. I have always found your statements very interesting and informative.

Dr. SHAW. Mr. Andersen, I had a few other tables I would like to present to the committee with your permission.

Mr. ANDERSEN. Proceed, Doctor.

RESEARCH IN INDUSTRY

Dr. SHAW. The first table that I bring to your attention shows facts about research in industry. It is based on a survey made by the Department of Defense and the Bureau of Labor Statistics, published in a bulletin in January 1953.

(The table referred to follows:)

Facts about research in industry in 1951

1. Total cost of research	[1] $1, 959, 100, 000
2. Proportion of industrial research cost borne by Federal Government (percent):	
All industry	47
Aircraft	85
Electrical machinery	58. 5
Chemical industry	7
3. Cost of research as a percent of sales:	
All industry	2
Aircraft	13
Electrical machinery	6
Chemical industry	2. 5
4. Cost per research worker:	
All industry	$8, 900
Aircraft	9, 900
Electrical machinery	9, 800
Chemical industry	7, 900
USDA	5, 700

[1] Survey of 2,000 companies, about 85 percent of all industrial research.

Dr. SHAW. The first figure in the table is the total cost of research in industry. This, as you will notice from the footnote, is based on a survey of 2,000 companies and represents about 85 percent of all industrial research. The total cost of that 85 percent was $1,959,100,000.

Mr. ANDERSEN. Over what period?

Dr. SHAW. In the year 1951, 1 year. The second item in that table is the proportion of the industrial research cost borne by the Federal Government. You will notice that the Federal Government supports 47 percent of all research in industry. The Federal part of support for research in the aircraft industry is 85 percent, electrical machinery 58.5 percent, and chemical industry 7 percent.

The third item in the table is the cost of research as a percent of sales.

Mr. ANDERSEN. Going back to the second item. If the Federal Government puts up 47 percent of the total cost of research by industry, that means that approximately $950,000,000 has been spent in 1951 by the Federal Government for that purpose?

Dr. SHAW. Yes, sir.

Mr. ANDERSEN. That compares to approximately $60 million in agriculture, if I recall.

Dr. SHAW. About $56 million.

Mr. ANDERSEN. Those are interesting figures, are they not, Mr. Marshall? There are a lot of people who say that we are subsidizing agriculture, and that is why I want it in the record at this point that our taxpayers put up 15 times the amount of money for research in industry than they do for agriculture research.

Mr. MARSHALL. Of course I have always, Mr. Chairman, objected to the feeling that when people appropriate money for agriculture that they are doing it for the farmer. They are doing it for themselves.

Mr. ANDERSEN. Why, surely.

Mr. MARSHALL. That is very evident from Dr. Shaw's chart.

Dr. SHAW. Yes, sir.

The next item in the table concerns the cost of research as a percent of sales. You will notice that all industry spends 2 percent of sales on research. That varies among industries, the high being 13 percent in aircraft and the lowest of the ones I have shown here, the chemical industry, 2.5 percent. It is obvious there are many industries that spend less than that, but the average for all industries is 2 percent. You will recall I used figures in the hearings last year that, considering both Federal and State expenditures for research, we are spending about three-tenths of 1 percent of the farm sales on agricultural research, whereas the average for all industry is 2 percent.

The fourth item that I have is cost per research worker. You will notice that in all industry the cost per research worker is $8,900. These figures are obtained by dividing the total research cost by all the people working on the research. Aircraft is $9,900, electrical machinery $9,800 and chemical industry $7,900. I included for comparison the cost in the United States Department of Agriculture, expenditures for agricultural research in principal fields by USDA and State agricultural experiment stations, which is $5,700.

INVESTMENT IN PRINCIPAL FIELDS OF AGRICULTURAL RESEARCH

In the next table I have attempted to break down the expenditures for agricultural research in relation to the work that is being done by the State agricultural experiment stations in the third column, by the United States Department of Agriculture in the second column, and the total in the first column.

(The table referred to is as follows:)

Investment in principal fields of agricultural research, fiscal year 1952, United States Department of Agriculture and State agricultural experiment stations

[In millions of dollars]

Item	Total	USDA	State
Utilization:			
Crop products	$8.37	$7.27	$1.10
Animal products	2.91	1.79	1.12
Forest products	1.45	1.30	.15
Human nutrition	2.97	.67	2.30
Total	15.70	11.03	4.67
Marketing:			
Marketing costs, margins, and efficiency	1.31	.86	.45
Improvement and evaluation of product quality	3.11	2.00	1.11
Improvement in market organization and facilities	2.78	1.47	1.31
Collection, analysis, and dissemination of market data	1.86	1.05	.81
Total	9.06	5.38	3.68
Farm and household economics:			
Economics of production	4.08	1.58	2.50
Household economics	.64	.42	.22
Rural life	.81	.20	.61
Total	5.53	2.20	3.33
Engineering—structures:			
Farm machinery and household equipment	1.75	.44	1.31
Housing—farm buildings	1.46	.39	1.07
Farm electrification	.42	.23	.19
Total	3.63	1.06	2.57
Animal production:			
Beef cattle	6.54	.85	5.69
Dairy cattle	6.95	1.81	5.14
Poultry	5.57	.98	4.59
Swine	3.55	.64	2.91
Sheep and goats	1.95	.48	1.47
Other	1.58	.62	.96
Total	26.14	5.38	20.76
Plant production:			
Field crops	14.89	4.00	10.89
Forage and pasture crops	5.71	1.19	4.52
Horticultural crops	16.21	4.74	11.47
Forests and ranges	6.31	5.18	1.13
Total	43.12	15.11	28.01
Soils research, total	10.04	3.27	6.77
Grand total	113.22	[1] 43.43	[2] 69.79

[1] In addition $3.92 million were made available to the Department from outside sources, principally for military needs and for foreign agricultural programs of only incidental interest to American agriculture.
[2] Includes $12.28 million of Federal-grant funds from 1952 appropriations.

Dr. SHAW. You will notice that for utilization research, the total is $15.70 million; $11.03 million in USDA, primarily at the regional laboratories, and $4.67 million in the States.

Marketing, $9.06 million total, $5.38 million in USDA and $3.68 million in the States.

Farm and household economics, $5.53 million total, $2.20 million in USDA and $3.33 million in the States.

Engineering and structures, $3.63 million total, $1.06 million in USDA and $2.57 million in the States.

Animal production, $26.14 million total, $5.38 million in USDA and $20.76 million in the States.

Plant production, $43.12 million total, $15.11 million in USDA and $28.01 million in the States.

Soils research, $10.04 million total, $3.27 million in USDA and $6.77 million in the States, giving a grand total in the fiscal year 1952 of more than $113 million, $43.43 million spent in the USDA and $69.79 million spent in the States.

This is a comparison based on where the work is done.

DISTRIBUTION OF RESEARCH FUNDS BETWEEN FEDERAL AND NON-FEDERAL SOURCES

The next table is the same story except that it is developed by the source of funds.

(The table referred to is as follows:)

Contributions to principal fields of agricultural research from Federal and non-Federal sources, fiscal year 1952

[In millions of dollars]

Item	Total USDA and State	Federal [1]	Non-Federal [2]
Utilization:			
Crop products	$8.37	$7.37	$1.00
Animal products	2.91	2.03	.88
Forest products	1.45	1.34	.11
Human nutrition	2.97	1.69	1.28
Total	15.70	12.43	3.27
Marketing:			
Marketing costs, margins, and efficiency	1.31	1.06	.25
Improvement and evaluation of product quality	3.11	2.32	.79
Improvement in market organization and facilities	2.78	2.07	.71
Collection, analysis, and dissemination of market data	1.86	1.38	.48
Total	9.06	6.83	2.23
Farm and household economics:			
Economics of production	4.08	2.30	1.78
Household economics	.64	.46	.18
Rural life	.81	.40	.41
Total	5.53	3.16	2.37
Engineering, structures:			
Farm machinery and household equipment	1.75	.74	1.01
Housing, farm buildings	1.46	.74	.72
Farm electrification	.42	.24	.18
Total	2.63	1.72	1.91
Animal production:			
Beef cattle	6.54	1.63	4.91
Dairy cattle	6.95	2.60	4.35
Poultry	5.57	1.77	3.80
Swine	3.55	1.04	2.51
Sheep and goats	1.95	.66	1.29
Other	1.58	.69	.89
Total	26.14	8.39	17.75
Plant production:			
Field crops	14.89	5.61	9.28
Forage and pasture crops	5.71	2.23	3.48
Horticultural crops	16.21	6.22	9.99
Forests and ranges	6.31	5.30	1.01
Total	43.12	19.36	23.76
Soils research: Total	10.04	4.40	5.64
Grand total	113.22	56.29	56.93

[1] USDA appropriations plus Federal-grant funds made available to the State agricultural experiment stations. In addition $3.92 million were made available to the Department from outside sources principally for military needs and for foreign agricultural programs of only incidental interest to American agriculture.

[2] Non-Federal funds of the State agricultural experiment stations.

Dr. SHAW. You will recall that in terms of the work done at the State agricultural experiment stations we have a Federal item of payments to States which distributes money to the State experiment stations. This table is on the basis of Federal funds and non-Federal funds. If you will look at the total figures, you will see that the Federal and non-Federal funds are just about the same, $56.29 million Federal and $56.93 million non-Federal or State money.

PERCENTAGE DISTRIBUTION OF RESEARCH FUNDS

The next table that I have was taken from the two just previous to show the percentage breakdown of the funds.

(The table referred to is as follows:)

Major relationship—Functional analysis—Agricultural research program (fiscal 1952)

1. Of the $43.43 million of USDA investment:

	Percent
Utilization gets	25
Marketing gets	13
Production gets—	
Farm and household economics	5
Engineering—structures	2
Animal production	12
Plant production	35
Soils research	8
	62
	100

2. Research field:

	Investment USDA and State	Percent of each field in USDA
	Millions	*Percent*
Utilization	$15.7	70
Marketing	9.1	59
Farm and household economics	5.5	40
Engineering—structures	3.6	29
Animal production	26.2	21
Plant production	43.1	35
Soils research	10.0	33
Total	113.2	

3. Of the $113.22 million in agricultural research, 50 percent was supported with Federal funds in fiscal 1952 (USDA and Federal-grants to States).

NOTE.—In addition $3.92 million were made available to the Department from outside sources principally for military needs and for foreign agricultural programs of only incidental interest to American agriculture.

Dr. SHAW. In terms of the USDA's $43.43 million, utilization research gets 25 percent, marketing gets 13 percent, and production gets 62 percent.

The second part of the table shows the proportion of the total work that is done in the USDA. You will notice that in utilization research, 70 percent is done by USDA; in marketing 59 percent; farm and household economics, 40 percent; engineering and structures, 29 percent; animal production, 21 percent; plant production, 35 percent; and in soils research, 33 percent.

RESEARCH LINE PROJECTS—NEW AND DISCONTINUED

The next table is one that we have inserted in the record, Mr. Chairman, in previous years showing the new and discontinued line projects handled by the central project office.

(The table referred to follows:)

New and discontinued line projects handled by the central project office

Agency	Calendar year 1950		Calendar year 1951		Calendar year 1952	
	New projects	Discontinued projects	New projects	Discontinued projects	New projects	Discontinued projects
Agricultural Research Administration:						
Office of Experiment Stations, including Alaska	21	11	16	16	27	35
Bureau of Human Nutrition and Home Economics	20	21	32	34	13	11
Bureau of Animal Industry	41	32	41	30	22	42
Bureau of Dairy Industry	23	14	21	22	9	12
Bureau of Agricultural and Industrial Chemistry	109	68	41	189	67	37
Bureau of Plant Industry, Soils, and Agricultural Engineering	77	33	31	47	41	52
Bureau of Entomology and Plant Quarantine	56	25	19	59	23	35
Bureau of Agricultural Economics	21	53	42	44	35	45
Soil Conservation Service	7				2	
Production and Marketing Administration	37	13	19	20	38	17
Forest Service			5	8		
Farm Credit Administration	14	9	27	12	18	19
Extension Service					7	
Office of Foreign Agricultural Relations	9			5	25	1
Total	435	279	294	486	327	306
Reason for discontinuance:						
Completed		208		208		191
Lack of funds, personnel, facilities, etc.		65		120		81
Other		6		[1] 158		34
Total		(279)		(486)		(306)

[1] Most of these projects were suspended in order to shift emphasis to research in support of the defense effort.

Dr. SHAW. For the calendar year 1952, we started 327 new projects. We discontinued 306.

Mr. ANDERSEN. That is very interesting, Doctor. This subcommittee has felt in past years that the Department perhaps was more eager to commence projects than to end them. I think your report shows the correct trend.

APPROPRIATIONS FOR ARA BY CONSTITUENT AGENCIES

Dr. SHAW. The last table is one that has also been inserted in the record at this point, giving the over-all appropriation for the Agricultural Research Administration, bureau by bureau.

(The table referred to follows:)

Net available, 1953 and budget estimates, 1954

Bureau or item	Appropriations, 1953 [1]			Budget estimates, 1954	Increase (+) or decrease (−) column 5 −column 4
	Actual	Secs. 411 and 412 reductions	Net available		
(1)	(2)	(3)	(4)	(5)	(6)
Office of Administrator	$342,000	+$323	$341,677	$367,000	+$25,323
Office of Experiment Stations:					
Payments to States, Hawaii, Alaska, and Puerto Rico	12,441,208	.....	12,441,208	13,453,708	+1,012,500
Salaries and expenses	380,000	.....	380,000	380,000	.....
Virgin Island agricultural program	100,000	.....	100,000	100,000	.....
Research on agricultural problems of Alaska	270,000	.....	270,000	270,000	.....
Total, OES	13,191,208	.....	13,191,208	14,203,708	+1,012,500
Bureau of Human Nutrition and Home Economics	1,414,500	−798	1,413,702	1,565,000	+151,298
Bureau of Animal Industry:					
Animal research	3,832,000	−348	3,831,652	4,360,000	+528,348
Animal disease control and eradication	8,807,000	−1,190	8,805,810	9,055,000	+249,190
Meat inspection	14,160,000	.....	14,160,000	14,160,000	.....
Total, BAI	26,799,000	−1,538	26,797,462	27,575,000	+777,538
Bureau of Dairy Industry	1,590,300	−245	1,590,055	1,815,000	+224,945
Bureau of Agricultural and Industrial Chemistry	7,500,000	−478	7,499,522	8,000,000	+500,478
Bureau of Plant Industry, Soils, and Agricultural Engineering:					
Plant, soil and agricultural engineering research	11,436,800	−872	11,435,928	12,165,000	+729,072
National Arboretum	149,000	.....	149,000	225,000	+76,000
Total, BPISAE	11,585,800	−872	11,584,928	12,390,000	+805,072
Bureau of Entomology and Plant Quarantine:					
Salaries and expenses:					
Insect investigations	3,889,800	−1,040	3,888,760	4,190,000	+30,1240
Insect and plant disease control	5,600,000	−592	5,599,408	5,600,000	592
Plant quarantines	2,700,000	.....	2,700,000	2,800,000	+100,000
Total, salaries and expenses	12,189,800	−1,632	12,188,168	12,590,000	+401,832
Control of emergency outbreaks of insects and plant diseases (contingency fund)	1,000,000	.....	1,000,000	1,000,000	.....
Total, BEPQ	13,189,800	−1,632	13,188,168	13,590,000	+401,832
Total, Agricultural Research Administration	75,612,608	−5,886	75,606,722	79,505,708	+3,898,986
Summary:					
Research:					
Grants (payments to States)	12,441,208	.....	12,441,208	13,453,708	+1,012,500
Contracts	575,000	.....	575,000	575,000	.....
Direct work	29,935,790	−4,064	29,931,726	32,392,430	+2,460,704
Total research	42,951,998	−4,064	42,947,934	46,421,138	+3,473,204
All other (control, regulatory, etc.)	32,660,610	−1,822	32,658,788	33,084,570	+425,782
Total [2]	75,612,608	−5,886	75,606,722	79,505,708	+3,898,986

[1] 1953 amounts adjusted for comparability with the appropriation structure proposed in the 1954 budget estimates.

[2] Table excludes program for eradication of foot-and-mouth and other contagious diseases of animals and poultry. The 1954 budget proposes language authorizing the Secretary of the Treasury to cancel notes issued by the Commodity Credit Corporation to the Treasury in the amount of $7,057,575 for costs incurred in fiscal year 1952 in connection with the program for eradication of foot-and-mouth disease.

Dr. SHAW. You will be discussing this work with the bureaus as they come up and I do not know that there is any need for us to comment further on it at this time.

Mr. ANDERSEN. Doctor, we will recess now until 9:30 tomorrow.

TUESDAY, MARCH 3, 1953.

Mr. ANDERSEN. The committee will come to order.

I believe, Dr. Shaw, that you have a few remarks you would like to make relative to changes in administrative items.

Dr. SHAW. I would like to mention 2 or 3 administrative items.

CONSOLIDATION OF SOIL RESEARCH PROGRAMS

During the year we have consolidated the soil management research programs of the Department into one single program. As you recall, we used to have 2 programs, 1 in the Soil Conservation Service, and 1 in the Bureau of Plant Industry, Soils, and Agricultural Engineering. We have tried to keep those well coordinated, but I think we are agreed we can have a better program if we put the two together. They were combined in the Bureau of Plant Industry. We have also consolidated our soil survey programs into one program in the Soil Conservation Service. That means, then, that a substantial part of soil conservation research that you have considered in the past will be in the Bureau of Plant Industry this year. The part remaining in the Soil Conservation Service relates to hydrology, or the engineering investigations on water flow and use.

ADDITIONAL RESEARCH ADVISORY COMMITTEES

One other item that I would like to call to your attention is that during the year we have established 3 new research advisory committees, 1 for forestry research; 1 for soils, water, and fertilizer research; and 1 for production economics.

Those were areas that previously had not come before the advisory committees we had. We felt it advisable to establish those advisory committees so as to give rather complete coverage to our research programs.

PROGRESS REPORTS TO ADVISORY COMMITTEES

In that connection I would like to call your attention to a new method of dealing with the committees that we have developed this year. We are currently preparing for each advisory committee what we call a progress report. This particular one I have just handed you is for the vegetable advisory committee. If you will look at the table of contents you will see the detail in which we present the program for the benefit of advisory committee members.

We break down the production part of the program into the sections: Introduction, breeding, genetics and evaluation; Pests and their control; Production practices, materials, and equipment; and Economics of production.

Then we have the utilization part of the program broken down into consumption and human nutrition; composition, quality evaluation, and preservation; development of new and improved products, processes, and equipment, and utilization and disposal of byproducts and wastes.

We have a section on marketing that deals with marketing costs, margins, and efficiency; maintenance and evaluation of product quality; improvements in facilities, equipment, and market organiza-

tion, and collection, analysis, and dissemination of market data, and we have an additional section on marketing service and educational work.

We give a detailed report of the progress during the year on this work, and point out problems, as we see them, that remain to be solved.

These reports are sent to the advisory committees 3 or 4 weeks prior to their meetings, and the subject matter of the total report is divided among the different members of the committee so that each member studies and is thoroughly familiar with a part of it. He reports his studies to the committee.

MEMBERSHIP AND OPERATIONS OF ADVISORY COMMITTEES

Mr. ANDERSEN. How many members are there on an advisory committee?

Dr. SHAW. We ordinarily have 11 members on a committee. The overall Agricultural Research Policy Committee was established by law as a committee of 11, and we have tried to follow that pattern in the other committees.

The advisory committees themselves have felt that this method of handling the work gave them a better opportunity to become familiar with the program, and to consider the things they felt were reaching a stage that could be finished; and others where the work could go on as it was; and others where there should be implementation. I think this will prove to be a very valuable new development.

Mr. ANDERSEN. How often annually does each particular committee meet?

Dr. SHAW. Our normal practice is to have one meeting a year.

Mr. ANDERSEN. And that is here in Washington?

Dr. SHAW. Not always. We have an arrangement whereby 1 year out of 3 we meet at one of the laboratories out in the field, either at one of our laboratories or at one of the State experiment stations. We find that is very helpful.

Mr. ANDERSEN. How many various committees are there?

Dr. SHAW. About 25.

Mr. ANDERSEN. 25?

Dr. SHAW. Yes, sir. Each one considers a segment of the total program. These members, as you know, are chosen from farmers and from the industry handling vegetables. We try to select them on a basis where they can really represent all the problems confronting that industry, and advise us in regard to the problems.

AGRICULTURAL RESEARCH JOURNAL

There is one other item that I wanted to call to your attention, Mr. Chairman. We have been concerned for some time, as you have been also, with the need in some way to get our research results more rapidly to the attention of the users of the results. As one step in that direction, we have initiated this little publication called Agricultural Research, which is intended to be a progress report on the current developments in agricultural research. We are making this available to the people who disseminate research information. Copies will go to vocational agricultural teachers, to county agents, to editors

of farm papers and editors of trade journals, and to our own research people at field stations.

Our endeavor is to get in the hands of the people dealing with farmers and disseminating information or latest results, so that in that way we can help get more rapid adoption of these results.

This is the first issue of the journal. This one you have is for January and February, on a 2-month basis. By July 1 we hope we can have it on a monthly basis.

Mr. ANDERSEN. I think that will help materially. How many copies of this will be published each 2 months?

Dr. SHAW. About 25,000 copies.

Mr. ANDERSEN. And they, as you have stated, will be placed in the hands of those who are best qualified to make use of them?

Dr. SHAW. Yes, sir.

RESEARCH PROGRAM IN ALASKA

The last administrative item I wanted to mention is the item for research in Alaska. Previously that has appeared in the Office of the Administrator, but it is proposed for transfer this year to the Office of Experiment Stations. Our purpose was to bring into one office all of our work relating to research in the Territories and possessions.

A further factor is that the building program in Alaska has been completed. We have a competent staff on the ground. We have established good working relations with the university, and we think we are at a stage where we can have more normal operation of that program.

The university has appointed a dean of agriculture, a farm member of our staff, to be in charge of their research, extension, and teaching programs. We hired him, sent him up there for this program, and he has been there for 4 years. The university has now hired him as dean of agriculture. That will contribute materially to the development of a closely coordinated program.

If it is agreeable with the committee, we should like to have this item considered in connection with the Office of Experiment Stations. It will be a program that I will follow very closely in the future, but I think from an administrative standpoint this transfer would be preferable.

Mr. ANDERSEN. We have the programs for Puerto Rico and the Virgin Islands under the Office of Experiment Stations, and it would appear desirable to have the Alaska program under that same office.

Now, Dr. Shaw, I wish you would describe for the record the organizational structure of the Agricultural Research Administration.

ORGANIZATIONAL STRUCTURE OF ARA

Dr. Shaw. We have in the Agricultural Research Administration six Bureaus: Bureau of Animal Industry; Bureau of Dairy Industry; Bureau of Plant Industry, Soils, and Agricultural Engineering; Bureau of Entomology and Plant Quarantine; Bureau of Agricultural and Industrial Chemistry; Bureau of Human Nutrition and Home Economics. The Office of Experiment Stations is another one of the major units.

Then we have the Office of Administrator, my immediate office, which has attached to it the Agricultural Research Center at Beltsville. That is the major, over-all aspect of our Administration.

Our office is one that deals with the bureaus on the basis of overall policies, clearance of projects, approval of the research that they do, the working out of uniform procedures in conducting research and developing cooperative relations with the States, and so forth, but the bureaus themselves are responsible for the direct operation of the programs.

Mr. ANDERSEN. I wish you would discuss the methods used to coordinate the programs of the various bureaus. How do you go about that?

COORDINATION OF PROGRAMS

Dr. SHAW. We have in the office what we call our central project file. In other words, we have a complete record of every research project that is conducted in the Department, not only in the Agricultural Research Administration, but in all other agencies in the Department.

These projects have to be approved before they can be put into effect in any one of the bureaus. In that approval process, first of all a bureau initiates a project. They send copies of it to all agencies of the Department that they think may be interested in it, and also send copies to my office. We examine it, and if we think there are other agencies in the Department that it should go to, we send it to them.

Then every agency is asked to comment on the project, as to whether or not they feel there is any duplication of work; whether they themselves feel that they should cooperate in the project; whether they feel that the project is worth while; whether they want to be informed on it; and so on.

If there seem to be no problems in terms of the Bureau proceeding with this work, as a result of all these contacts, we then give the bureau chief authority to go ahead on it. On the other hand, if it turns out either that someone from my staff or from any other agency sees there is any possible duplication, that is looked into. That all has to be done before the project can be approved, so when a project is approved we satisfy ourselves that (1) we feel the project is needed; (2) it is in line with the recommendations of the advisory committees in the particular field; (3) it does not duplicate other work in the Department; (4) adequate cooperation has been worked out between the Bureau and the States; and (5) there are adequate facilities and personnel to conduct the work.

We have copies in the Office of Experiment Stations, not only of the projects that are financed by Federal funds under payments to States, but also, the States have cooperated with us in furnishing copies of projects financed by their own funds. This is done voluntarily by the States. So that when a State initiates a project, they send it to us before they start work on it, and we advise them if there is related work being carried out in another State, and perhaps it is advisable to spend the money on something else. Another thing would be, we could advise them that somebody has some related work going on and we think they should get together.

So I think we have a fairly satisfactory method of coordination, first within the Department, and second, between the Department and the State experiment stations.

Mr. ANDERSEN. There would seem to be very little chance for duplication, then.

Dr. SHAW. We try to satisfy ourselves that there will not be any. The consolidation of soil-research programs into one was due to the fact that when you have two programs going on that are closely related, there is greater possibility of getting some duplication, and therefore we have consolidated those.

PROGRAM DEVELOPMENT

Mr. ANDERSEN. When you consider the setting up of a new program, how do you determine the need?

Dr. SHAW. In the general development of a program, we have what we call a working group, say in the vegetable area. We have a working group, appointed in the Department, of scientists representing all the bureaus in the Department that have an interest in vegetables. They are chosen because they are familiar with the work of that Bureau in the vegetable area.

Those people get together to develop the progress report that we send the advisory committees. They consider amongst themselves what they feel are the primary needs in the vegetable area. They develop then, in terms of the progress report that we furnish to the advisory committees, their suggestions of what they feel are primary problems in the industry.

This report is furnished to the advisory committees. The advisory committees get it 3 or 4 weeks in advance. When the committee meets they go over the program in detail, and finally come up with recommendations. They will have a recommendation on going work that they feel has reached the stage we can wind it up. Second, they will consider the area of work they feel should go on about the way it is now being conducted. And third, they will come to areas where they think that going work ought to be expanded. Then, finally, they get to the consideration of new work.

On any new work they are considering, they develop a priority list from one on down. They place priority 1 on the project they think is most important; priority 2, priority 3, and so on down.

Then, in terms of their report, after we get it, I send the report to all the bureaus and ask them, in terms of projects that would apply in their particular area, "Do you agree with the advisory committees on the recommendations they have made, and if not, I would like to have a statement from you as to why you do not agree."

Normally there will be agreement. In some cases there will not be agreement. I have to decide myself, in terms of the administrative responsibilities that I have, which set of recommendations I will follow. If the scientists——

Mr. ANDERSEN. How often do you have such a conflict?

Dr. SHAW. Not very often. If there is anything that has the appearance of a conflict, we come back to the advisory committees and discuss why we took the action we did, and I know of no case where, in that subsequent discussion, we have not come to an agreement that I took the right action.

Mr. ANDERSEN. Continue, Dr. Shaw.

Dr. SHAW. What I was going to say, our scientists are considering the problems in terms of the future. In most cases they are the best

informed persons on what the future holds, so if they say that in order to really get at one of the problems we need to do this piece of fundamental work first, and they can convince me that is right, I say, "Go ahead and do this, and we will explain it to the advisory committees," and, as I say, we have always come out in agreement in such cases. But by and large I would say 95 times out of 100 we have complete agreement with advisory committees, because in these discussions we have the working group meet with the advisory committees, so that when questions come up we discuss them back and forth so that we can get each other's ideas. In most all cases we come out with an agreement.

Mr. ANDERSEN. Having decided a certain program is worthwhile, do you then clear it all along the line for possible duplication?

Dr. SHAW. Yes, sir.

FUNDS REQUIRED FOR RESEARCH PROGRAM

Mr. WHITTEN. Dr. Shaw, please tell us how much money is needed to meet this research problem. I ask that because, under the procedure we follow, I understand you are limited to requesting the budget amount, and if increased amounts are needed, I would like you to express yourself on that.

Dr. SHAW. Mr. Whitten, I recognize that in considering research needs, they must be considered in relation to all other needs of the Government, and you have to consider factors in Congress and in this committee that are beyond the scope of my knowledge. Looking at research itself, however, I am convinced in my own mind that within the next 10 years we have to double agricultural research in this country, between the Department and the States. It has to be doubled. That means that if we were to start on that now, it would take an increase of $10 million to $15 million a year to get to that point in 10 years.

Mr. WHITTEN. You mean an increase each year of about that much?

Dr. SHAW. Yes, distributed between the Department and the States. The way we are now going, it is about half and half.

Mr. WHITTEN. Do you see the qualified personnel available to do anything like that?

Dr. SHAW. We have made a fairly careful study of personnel in relation to that kind of a need, and I believe we could move that fast and have adequate personnel to do the work.

DUPLICATION IN THE RESEARCH PROGRAM

Mr. ANDERSEN. Dr. Shaw, I want to give you an example of what I consider apparent duplication in the research program.

AMA, for instance, is requesting an increase of $59,667 to do research on mechanization of farming operations. Under "Experiment stations," as part of the support for an increase of $1,000,000, additional research on mechanization of farm production is proposed. Under the Bureau of Plant Industry, under the item of "Agricultural engineering investigations," on which we are now spending close to $1,200,000, an increase of $40,072 is proposed for research on the improvement of equipment for harvesting and cleaning grass and seed crops.

That, to me, is a pretty good illustration of possible duplication of research in that one specialized field. Do you have any comment on that?

Mr. HORAN. I would like to agree with you, Dr. Shaw, about increasing research funds, but we have a lot of things we have to catalog and know what we are doing, not only in the Federal Government, but in the land-grant colleges. What we have done with AMA is to confuse the situation rather than clarify it.

If you will recall, while Dr. Cardon was still head of research, I suggested we have a national fair and more or less indicate the types of research and where it was being done in the United States so that we would know where we are. I think we will have to do that before we can convince people that the right hand knows what the left hand is doing in this research field. I say that not in criticism, but as something that appeals to me as the place to begin.

Mr. ANDERSEN. That is right, Mr. Horan. I am trying to find out from Dr. Shaw specific methods of coordinating these programs between the various bureaus.

Let me cite an example of what appears to me to be duplication in the general field of research on fertilizers. Under "Experiment stations" we have an item, "To strengthen program on use of fertilizers and maintenance of soil productivity." That item is given as partial justification for a $1 million increase.

Under "Human nutrition and home economics" we have an item, "Analysis of nutritional quality of foods produced under known conditions of * * * fertilization," and that, again, is partial justification for $729,540 requested for food nutrition investigations.

Under the Bureau of Plant Industry, we have the following statement as partial justification for an increase of $364,000—

for increased production of feed crops through use of more fertilizers * * * Also pasture fertilization studies to increase beef production.

Then under the Bureau of Plant Industry there is an item of increase of $100,000—

for investigations on the influence of soils, fertilizers, and management practices on the nutritional value of plants.

Yesterday we discussed with the Bureau of Agricultural Economics their request for an increase of $100,000 to determine the most profitable use of fertilizer in important production areas.

I have quoted these two general headings as examples of what appears to be duplication. I am glad that you have assured the subcommittee that you do make a very detailed study of projects to prevent any possible waste along the line so far as you know. That is correct; is it not?

COORDINATION OF SOILS AND FERTILIZER RESEARCH

Dr. SHAW. Yes, sir. But let me give you an illustration in relation to the fertilizer.

To start out with, we have what we call regional research committees. They are set up in terms of land-grant-college regions. There are four of them. The head of the soils department of each State and our folks from Beltsville make up the membership of those committees. There is a similar one in each of the four regions.

That committee, made up of research people, first tries to consider what are the problems of the whole region in terms of soils and fertilizers and related work. In working out a program, we try to see what programs are of interest only to particular States. Those programs are assigned right away to those States.

Then we will come to an area of work that is of concern maybe to 2 or 3 States, or maybe to all States in the region. If you can do the work by having a portion of it done in Idaho, a portion in Washington, and a portion in Oregon and can come out with these total results, this, again, will usually be a State job that they will do.

But frequently you will find there is some underlying problem that will apply to all of the States, and in terms of the most effective use of the money, that had better be done in one place for the whole area. That is the kind of job the Federal Bureau comes into, and generally in that case there is cooperation both in funds and personnel with the States working with us on that program.

I am very aware of the fact that with a project showing up such as the use of fertilizers on corn, let us say, in Iowa, and another in Ohio, and another in Minnesota, it would appear there was duplication; but the soil is different and the climatic conditions are different. You must make the application on the soils of the particular area in which you are concerned.

Many people in many States, with the help and cooperation of the Department, may be studying something that appears to be a very closely related piece of work. We do very definitely attempt to eliminate all unnecessary duplication, but when you get right down to it, in Iowa they have 12 different regions where you have to have 12 different hybrids. When you move to another State you have another situation. You have to have different fertilizer methods.

So, in terms of getting this research information adopted over the country, you must have applications in specific areas. The Federal Government comes in whenever we are working on a problem of regional and national interest, and where it seems feasible and advisable for the work to be done centrally for a region rather than each State doing it independently.

COORDINATION OF WORK ON MECHANIZATION

In the other illustration that you gave on mechanization of farming operations, under the Agricultural Marketing Act the mechanization we do there is after the produce leaves the farm, trying to mechanize the off-farm handling. The Bureau of Plant Industry does have studies on mechanization. We are attempting to work in cooperation with the States and to utilize the Federal effort in work that has regional interest over, say, the Southeastern part of the United States, or in the Great Plains, or wherever there is regional interest cutting across the States, and where we feel that through cooperation we can save expense.

Mr. ANDERSEN. My questions are asked not in the spirit of criticism whatsoever. But I do think this subcommittee should go into this matter each year, so as to prevent the wastage of money where possible. After all, such wastage would impair the good name of your organization.

CENTRAL PROJECT OFFICE

Dr. SHAW. I think one of the most effective means of preventing duplication is the Central Project Office I mentioned, where we have a copy of every project that is going on.

Mr. ANDERSEN. Tell us about the setup of that particular Central Project Office.

Dr. SHAW. We have in this central project file all the projects of the Department and of the States. About 12,000 projects, Federal and State, are cataloged by agency and by subject matter. Say we have in the file a heading that says "Forage crops," and under that we will have "Breeding on forage crops." We have all the projects on breeding together so that anybody can inspect them.

I have today eight research coordinators who are analyzing these things all the time, and when there is any apparent problem, we look into it. We look into it immediately.

The file is shown in this picture. It is a file that we can get at quickly. We keep that on a day-to-day basis, and each month we send out a published list to our own people and to the State experiment stations of every new project started and every project discontinued during the month, so that we not only keep our Department informed, but we keep every State informed. If anyone conceives any duplication, he will be writing to us.

This is a list of new and discontinued projects for January 1953 in the Department. This information goes to all the administrative people in the Department and all the administrative people in the State experiment stations so that we can keep current on the projects. We have our project file current daily.

FOLLOWUP PROCEDURE

Mr. ANDERSEN. Mr. Horan, do you have a question?

Mr. HORAN. Yes. Dr. Shaw, I would like to have you tell me what procedures you go through in order to justify a project, and also what procedures you follow to check on that project, and what procedures you have to terminate a project.

Dr. SHAW. Mr. Horan, I have previously described procedures for justifying a project. With your permission, I will confine this discussion to the followup and termination of projects. When a new project is approved it is approved for a definite time, say 1, 2 or, 3 years. No project is approved for more than 5 years. If any work is carried on beyond the original termination date, it must first be reviewed, and I must be satisfied that an extension is advisable. Any project that has been conducted for 5 years must be rewritten. It is subjected then to exactly the same procedure as is used in starting new work.

RESEARCH RECOMMENDATIONS OF COMMODITY COMMITTEE

Mr. WHITTEN. I recognize, Dr. Shaw, having gone through this for a period of years, some of the problems confronting you. One of the things that I take some pride in is that as the chairman for some time, we on the committee changed the operation of the research activities of the Department of Agriculture.

When we took over, the appropriation was in three categories: We had the Research and Marketing Act, we had regular research, and we had the Secretary's special research fund. Only the portion of that under the Research and Marketing Act of 1946 provided for review by the commodity committees. It was quite a powerful position for the members of this subcommittee to be in, because it gave them considerable control over individual products.

In our effort to see that this money went to places that it should and that the efforts were directed to the problems that should be solved, this committee directed that all of these funds be lumped together, and all research activities of the Department be subject to the review of the commodity committees instead of only those under the Research and Marketing Act.

Thus, any research in the Department of Agriculture is subject to the study and recommendations of the commodity committees, with the people in private business on the committee presenting the problem with recommendations to you folks and vice versa. I have been pleased to see the way that has worked.

What percentage of the things that the advisory committee people, people in the trade, ask you to do, are you able to do, and what percentage of such requests do you have to turn down? Your best estimate on that would be sufficient.

Dr. SHAW. In terms of the review that they made last year, after they had gone over all the work, suggesting possible terminations and changes, they recommended enough new work to require a total of $31 million more than what we have.

Mr. WHITTEN. So you do have, then, people in the business throughout the country wanting to do $31 million more work than you have the money with which to do it.

Dr. SHAW. Yes.

Mr. WHITTEN. So that provides incentive on the part of the folks in the business to try to make certain that the work actually done will bring results.

And do you not think that is about as good a whiplash as any group could have? Naturally it is going to make you move on from that which has already been answered, or that which should be abandoned, into some new field where there is a great need.

Dr. SHAW. I am sure that the greatest guaranty that the work we are doing is deemed most important is the fact that there are so many problems that need to be attacked. Therefore, we strive to not spend any money unless it is on something that is highly important.

Mr. WHITTEN. And the folks who have the problems, and who know the problems, are on the commodity committee and are familiar with what is being done all the time.

Dr. SHAW. They are.

AREAS NEEDING INCREASED RESEARCH

Mr. WHITTEN. I would like to ask you to point out in the record, if you care to, the places in research where increased activity may be more needed than elsewhere. I would not expect you to do that offhand, probably you would want to prepare some statement for the record.

Mr. HORAN. May I ask a question right there, Mr. Whitten?

Mr. WHITTEN. Certainly.

Mr. HORAN. To point out my interest in bringing this research close to the farmer, where the farmer might feel some interest in it.

Dr. SHAW. You would like to have me put a statement concerning that in the record?

Mr. HORAN. Yes. I do not want to discolor Mr. Whitten's request.

Mr. WHITTEN. Not at all.

Mr. ANDERSEN. Without objection that will be included in the record at this point.

(The information requested follows:)

THE PLACES IN RESEARCH WHERE INCREASED ACTIVITY MAY BE NEEDED MORE THAN ELSEWHERE

It is difficult to single out particular areas of research that are more in need of strengthening than others. We make a concerted effort to maintain a balanced program within whatever funds are available to us. Actually, most agricultural research will have to be strengthened if the Nation's needs for agricultural products and services are to be satisfied in the years ahead. In my opinion, the increases in the fiscal year 1954 budget for research provide for expanding the No. 1 priority items. In developing the budget within the funds allowed, I selected these items on the basis of their urgency. If additional areas of research could be expanded I would place emphasis on the following items:

(1) Diseases and insects affecting both plants and animals. Wheat smut in the Northwest and vesicular exanthema disease of hogs are examples of the problems.

(2) Plant, animal, and human nutrition. Basic physiological studies of nutrient uses and requirements are needed.

(3) Soils and irrigation. Water will set the ceiling on crop yields. We need to develop methods of soil and watershed management to increase the efficiency of water use in both humid and arid regions.

(4) Farm mechanization. Labor-saving devices for farm operations are of critical importance to farmers.

(5) Food and feed preservation. We can bring greater stability to agriculture if we can develop methods of converting perishables into acceptable products that may be stored.

(6) New and improved uses of agricultural products. Agricultural markets are getting away from us because we are not developing and improving our products as fast as competitive products are being developed and improved.

(7) Marketing. Additional studies are needed to cope with current problems arising as the result of declining foreign markets, accumulating or impending surpluses, and falling prices for agricultural products.

(8) Survey of soil and forest resources. An accurate knowledge of our resources is required for efficient management.

Mr. ANDERSEN. Mr. Hunter.

MERIT OF SOME RESEARCH PROJECTS QUESTIONED

Mr. HUNTER. With reference to agricultural research, I think with the passing of time there have developed a number of frills—I think we can all agree on that—and these frills cannot all be declared useless, but I personally question the value of many of them at a time when we are faced with a tremendous national debt and a multi-billion-dollar deficit during the next fiscal year, as well as the current one.

I have thumbed through this magazine on agricultural research for January–February 1953, which has been furnished us this morning, and note an item here entitled "Saving on Cotton." The first paragraph reads:

The new cotton-opening and cotton-fluffing machine developed by the Bureau of Agricultural and Industrial Chemistry is proving its merit. Textile mills have installed at least 13 of the openers, which make cotton clean easier and spin better.

I would not think of questioning the value of research that will develop a machine of that type. But I turn to pages 8 and 9, a two-page spread entitled "The Farmer Grows a House," and we find a picture with the statement underneath, "Dining area is set off with 2-by-4 trellis that keeps room light and airy."

And then another picture with the statement "Kitchen includes laundry area (at left, not shown). One counter section is built for seated work," and so forth.

Frankly, you can read such material month after month in House Beautiful, American Home, Better Homes and Gardens, Sunset, and other similar magazines, that do not cost more than 50 cents. As a matter of fact, practically all of them are available at public libraries, and there is hardly a building contractor in the United States who will not furnish on request pictures of this type, as well as floor plans. I think this is something that private enterprise is taking care of adequately and can be done without benefit of Government assistance.

I would like to know just how much money is being spent annually on a project of this type.

Mr. HORAN. Could I say just a word there, Mr. Hunter?

Mr. HUNTER. Yes, of course.

Mr. HORAN. This is the type of project that probably should have a beginning, middle, and an end. Along with Mr. Hunter's question of Dr. Shaw, you recall that some 3 or 4 years ago we required the Bureau of Agricultural Engineering to develop a type of low-cost expandable house, and in that regard I think they have done a pretty good job. Presumably, it was a project that should be through, should it not?

Dr. SHAW. You will also remember, in connection with what you are just saying, that we needed some housing for dairy milkers out at the Research Center, and after discussing the matter with this committee it was decided that we ought to kill two birds with one stone. While we were putting up the smaller houses for dairy milkers, we ought to try to develop plans that we could then make available to farmers for building their own.

So, in this project, while we were building the house for dairy milkers, we brought in the agricultural engineers of the Bureau of Plant Industry, and some folks from the Bureau of Human Nutrition and Home Economics, too, to try to decide on the type of house that could be built easily by a farmer and that would incorporate some of the more desirable features. Those houses are coming to a close; yes.

Mr. HUNTER. These plans are shown week after week in such magazines as House Beautiful and Better Homes and Gardens, indicating that you can get as much living space as they can here out of so many square feet of building space, and the idea of combining a living room and a dining room, of combining a den with a bathroom, such as indicated in these pictures, I again say is something you can see every week printed in newspapers and magazines. And, frankly, I just cannot see the value of it. Apparently it originated with instructions from the committee that something should be done to find an expandable house for farmers, but every Saturday afternoon you can

look at the advertisements in the Washington Star and see a lot of plans as to making houses expandable.

During a time when our Treasury is faced with so many calls, do we have to devote money to projects of this nature, involving publication of I do not know how many thousands of copies being printed, and devoting a two-page spread to it, which carries exactly the same kind of information seen in any number of magazines throughout the United States every week, and also is carried in the newspapers?

Mr. ANDERSEN. Mr. Hunter, I think the purpose of your question is not so much directed at this specific item but that you want to know, through Dr. Shaw, whether or not sufficient consideration is being given to private research.

Mr. HUNTER. My question, while I think the idea is a good one, is directed more to whether this cannot be furnished outside the Government.

Mr. ANDERSEN. You question perhaps the possibility of duplication?

Mr. HUNTER. Yes. I agree with Mr. Horan in the question that he posed: That perhaps the time has come when the particular project be terminated, and the further question is, Do they ever terminate a project?

Mr. ANDERSEN. Dr. Shaw, do these advisory committees that you have referred to take into consideration similar research in private industry?

Dr. SHAW. We do not have a complete list of all the projects that are carried on by industry. We do have some. It is much more difficult to get at some of them.

Mr. ANDERSEN. Do you have some men who follow up questions like Mr. Hunter has raised, to prevent duplication in research carried on by private industry?

Dr. SHAW. We try to; yes. I think the criticism, if it were raised, would relate to the amount being spent currently in the Department of Agriculture on farm housing and related research of equipment on homes. It is $139,880. Of this amount, $37,580 is in Bureau of Plant Industry, Soils, and Agricultural Engineering, and $102,000 by the Bureau of Human Nutrition and Home Economics. I say the critical question we are confronted with today, when we have better transportation, when we have rural electrification and all of that on the farm, is whether farm housing requirements are the same as those of the city. If they are, then I say, we have reached a situation where this item could be cut out. We have continued the research on housing in the past because we have felt that the farm housing accommodations, were different than those found in the cities, and that the farms were not being furnished adequate services.

Mr. HORAN. May I ask you a question right there?

Dr. SHAW. Yes.

NEED FOR COST REDUCTIONS IN FARM HOUSING

Mr. HORAN. We also developed this further fact, that for a veteran or a man beginning a farming operation, we recognize that he had a capital investment, had to have, if he were to become a producer, and that his capital needs were so great that he had to give very careful

consideration to the investment that he put into that operation, investments which were nonproductive.

We recognize that a farmer requires on the average of somewhere between $18,000 and $35,000 in order to get started in a minimum way today. Consequently, what we could save through preliminary work and other savings in the case of shelter and clothing was very appropriate.

Dr. SHAW. Yes.

Mr. HORAN. Because with the farming of his land we recognized that he might be able to have his own food.

EMPHASIS ON RESEARCH DEALING WITH PROBLEMS ON THE FARM

Yesterday, Dr. Shaw, I indicated that we would like to have you outline to us those research projects which were closest to the farm life, the mechanization field, where we have not been too successful. I have in mind a project that is under way now at Michigan State College on the possibility of using a lift truck, with a crow's nest on it, that is mobile, and which might be used to speed up the hand-picking of fruit on trees.

Dr. SHAW. Yes.

Mr. HORAN. That is what I am wondering about. I have my own doubts about the project being successful, for a number of reasons. However, it is in that direction that I would like to see some research made, because it is close to the farmer himself, and is a part of his production cost, his harvesting cost, and so I indicated yesterday that we would like to have you prepare yourself to tell us of any emphasis that exists on research problems that are really close to the farmer and intimate with the farmer's problems.

Dr. SHAW. Well, 62 percent of the total program, Mr. Horan, is on the farm; I mean, deals with problems on the farm. The other 38 percent is concerned with utilization and markets, in which we are attempting to develop wider uses for agricultural products and to make the marketing system more efficient. But we very definitely are trying to help reduce the farmer's production cost; that is where he is in the squeeze currently, and as you said, when we initiate work like this fork-lift to move a vehicle around an area, we cannot be certain of success. I do not know that we can be certain of success on any problems that we start. Taking into account the best thought all the people have, it appeared to be something that will mean a return and one of benefit to the farmer, and I think we are justified in going into it.

As soon as we find out that it is not possible we ought to stop it and take on something else, and we have tried to do that as best we can.

Mr. HORAN. It is my understanding in this particular case they used one of the lift trucks, and put a crow's nest on top of it and they were able to pick the fruit, but the difficulty was that they were not able to get the fruit down from the perch.

Dr. SHAW. We are trying to overcome that. There are some other developments along with it: some rubber tubes which they can use to roll the fruit down without using a basket in such manner as to eliminate a lot of bruising. I do not know whether it is going to be a success or not, but there are many farmers who are interested in it.

Mr. HORAN. That is the sort of thing I had in mind. Are there any other examples that might be useful to us?

Dr. SHAW. I think practically all of the work that we do in trying to mechanize farming, whether it be on the land or whether it be on the mechanization of harvesting, or whatnot, aims to eliminate labor and help reduce production costs as much as possible.

Mr. HORAN. You have told me something about thinning—I do not know whether you talked to the other members on the subcommittee or not—but by thinning, what we do is that in June of each year the fruit sets the next year's crop. I do not think that is generally known. But this year while the crop is still on the apple tree in June the fruit spurs are there for next year's crop, so that in commercial operation we thin this year and thus reduce the burden on the tree, so as to eliminate the loss the next year, and thus have a good crop each year.

We have discovered that with certain chemicals, by airplane, we can actually thin by dusting.

Dr. SHAW. Yes.

Mr. HORAN. We kill some buds. Is that not what is done?

Dr. SHAW. I am not certain of that, but I know we are operating with these hormone sprays. In the whole field of agriculture we are working as hard as we can to eliminate any of the costs of farming operations. And in many of the problems of mechanization the purpose of mechanization is to reduce costs on the whole operation from production clear through to harvesting.

Mr. HORAN. The biggest saving we have had in the fruit industry, with which I am very familiar, has not come from the Government. It has come from food machines and patents that have been acquired by enterprise and private industry, to spread insecticides, such as we do on the little orchard that my brother and I own, where we can take 1 man in an hour or two and do about the same work, that used to require a day and a half with 2 men and a lot more chemicals. So we have made some saving there on that farm.

Dr. SHAW. Yes.

Mr. HORAN. That is where we want to try to increase efficiency.

You are doing some work also on the size of containers; particularly on potatoes; are you not?

Dr. SHAW. Yes, sir.

Mr. HORAN. Presumably it saves money and increases efficiency. Could you tell us something about that?

Dr. SHAW. I can, if you want me to now, Mr. Horan, but we are going to have a discussion of this whole agricultural marketing subject a little later.

Mr. HORAN. Very well.

ADVISABILITY OF SEPARATING CONTROL AND REGULATORY ACTIVITIES FROM RESEARCH—

Mr. ANDERSEN. Dr. Shaw, what is the latest thinking of the Department as to the advisability of divorcing inspection and regulatory activities from the research work, and to perhaps create a separate bureau or even a separate unit under ARA?

Dr. SHAW. I cannot inform you as to what the Secretary is thinking on the matter in terms of regulatory and control work. We have in

the Agricultural Research Administration such things as meat inspection and the control of livestock diseases. We feel that it is quite important to have that rather closely associated with the research work, because of the fact that in that way we can bring to bear on research programs the needs of control and regulatory programs, and vice versa.

In a research field you have to get it where it can be used, and if the regulatory or control activity is separated very far from the associated research then it becomes more difficult. My own personal thinking is that there is a lot to be gained by having it rather closely associated.

Mr. HORAN. If you want a good practical example, Mr. Chairman, the Department of Agriculture, of course, licenses all new insecticides. That runs into the regulatory work and the enforcement work of the Food and Drug Administration. Of course, the Department is required to help everybody to protect their crops while they are growing.

CONSOLIDATION OF FIELD STATIONS

Mr. ANDERSEN. Dr. Shaw, have you ever made any special study of the possibility of consolidating field stations into a few major research centers, similar to the one at Beltsville, at various points through the country?

Dr. SHAW. I think in answer to your question we have to consider the possibility of consolidation of smaller field stations to make them more effective in the larger units. I do not think that we have any possibility of having a few centers like Beltsville, because the conditions are so vastly different; we are going to have to have these stations out in the area where the problems are.

Mr. ANDERSEN. You think you would be apt to be duplicating to a large extent the work of the various experimental stations through the area?

Dr. SHAW. Yes. When we take into consideration something like the four regional laboratories of the Bureau of Agricultural and Industrial Chemistry, which I think are highly efficient, we have to work in these centralized laboratories, rather than have the work spread out all over the country at the State experiment stations.

But when you get into the production problem, you must work in the area where the problems are.

I think we can go farther, in terms of concentration. We, of course, have a lot of problems of which each of us is aware, in terms of trying to close out one little field station and consolidating it with another, because it is giving a lot of service to the farmers close to that area.

SURVEY OF RESEARCH FACILITIES

Mr. ANDERSEN. That brings up another question along the same line: Do you believe a survey of all of the facilities in research throughout the country would be advisable from the standpoint of possibly reducing the holdings in land, equipment, and livestock?

Dr. SHAW. From the standpoint of research itself I would say that probably some economies could be effected in terms of more consolidation than what we have at the present time as between the Department and the State experiment stations.

In terms of getting results that we can utilize, I am not so sure, because if the farmer has an opportunity to get to a station in his immediate vicinity, or, say, 40 or 50 miles away, he is more likely to see research results that he can put in operation than if he undertakes to get the results from reading about it in some journal. Some of the State agricultural experimental stations do locate a substantial amount of their work out away from the main stations.

But in response to another part of your question: In this survey that I intend to make prior to the 1955 budget, I am reviewing every federally operated field station to see whether there is any possibility of its being eliminated or consolidated with some other station.

Mr. ANDERSEN. And to determine whether there is possibility of eliminating some deadwood.

Dr. SHAW. Yes.

Mr. ANDERSEN. That is part of the purpose of your study?

Dr. SHAW. Yes, sir.

Mr. ANDERSEN. You will make a careful inventory, I presume, as you go along.

Dr. SHAW. Yes, sir.

TRANSFER OF FEDERAL RESEARCH FACILITIES TO STATES

Mr. ANDERSEN. The question was asked here, previously to today, relative to the possibility of your turning over to private research certain phases of research now performed by the Department of Agriculture. Is there possibility that you could turn over some of the research to various States?

Dr. SHAW. Certainly we should continue to explore both views on that, and I think we are. This ties back to the question of these field stations. You recall that back in the early days of the development of the West, out in the dry lands, where different State experiment stations were not well established at the time, we established some field stations.

A good many of those, as of today, seem to have served their purpose and you remember a bill was introduced in Congress some 2 years ago which was passed, giving authority to transfer some of those stations to the States. That has been done.

Mr. ANDERSEN. I was going to ask if you had taken advantage of the provisions of that law, and whether you have turned over some of those stations?

Dr. SHAW. Yes, sir. At least, we have transferred the operations; we have not had all of the property transferred. We have a good deal more work to do, and we are giving some time and thought to that. I think we should try in connection with the several federally operated stations, to determine if it is possible that the State can handle the work.

RESEARCH NEEDS RELATED TO POPULATION GROWTH

Mr. ANDERSEN. Last year, Doctor, you gave us a very excellent presentation relating to the need for research as related to our population growth. Can you bring the committee up to date concerning the probable population increase and the additional production and acreage requirements, because of such increased population?

Dr. SHAW. Well, we are currently increasing the population at a rate of about 2.7 million a year. That requires in terms of feeding the population, with the diet that we currently use, that we have the equivalent of the production from an additional 7.5 million acres each year. We are not bringing that much new land into use, or anything like that amount.

Now, in terms of the research program, I feel that we are developing improvements in agriculture in the Nation, that are currently equivalent to providing new additional production from about 5 million acres of land. So we are falling behind. As I mentioned yesterday, in a good many areas of research, we are coming closer to equilibrium between the forces of research pushing up as opposed to the forces of insects and diseases and drought pushing production down.

We are leveling off somewhat on the research curve. We must push harder with research if we are to meet the new needs of a population of 190 million that it is estimated we will have in 1975, which means some 30 to 40 million more people to use agricultural products.

Mr. ANDERSEN. You mean using the same diet level that we have now?

Dr. SHAW. Yes; and the 190 million population, if it continues to increase at the current rate will be reached in 1965 rather than in 1975, so the 190 million is not too high an estimate.

Mr. ANDERSEN. If that is the case, in a very few years we will not be troubled with surpluses of food.

Dr. SHAW. The problem in that situation is illustrated by the condition we are in in agriculture right at this time. We must drive to increase production in the order of magnitude that I have mentioned, but that may not occur in an orderly manner, because we are going to continue to have good years and bad years.

And as we move forward, we are going to be continually confronted with having surpluses in some years and shortages in other years, so we have to continue our work in marketing, and in stabilizing perishable products so we can use them over a longer period of time. If we could convert the perishable into a stabilized product and carry it for 6 months longer, we could do a lot more in terms of stabilizing farm markets. I am sure we are going to have to continue to be worried about recurring periods during which we are going to have some commodities in surplus.

Mr. ANDERSEN. You say that we are apt to have 190 million by 1965?

Dr. SHAW. I have taken the estimate of the Census Bureau that we would have a population of 190 million in 1975, but as I pointed out, if the population continues to increase at the rate we now have, we will have that population of 190 million by 1965.

FOOD STOCKPILING TO OFFSET LEAN YEARS

Mr. ANDERSEN. Mr. Marshall, I believe you had a question relative to the population increase you wanted to ask Dr. Shaw?

Mr. MARSHALL. Dr. Shaw, you made a comment about the population growth and the problem in connection with the amount of acreage that was required to provide for that growth, and also in connection with the amount of units of food that we would need for that increase in population.

Dr. SHAW. Food and fiber; yes.

Mr. MARSHALL. Yes. In that connection it is quite possible, is it not, that we may need to raise our sights as far as carrying reserves from one year to another is concerned?

Dr. SHAW. We could run into tremendous difficulty with droughts, such as we had in 1934 and 1936. Today, in terms of what we are producing, if we had a drought like that next year, we would really be in trouble. Right now, if we can determine ways so that we can take care of this reserve in a way that it will not influence the price the way it has done in certain items, we should be doing it. With drought, and with disease—for instance, with this stem rust—we have just been lucky. If we should have an infestation of this new stem rust, it could wipe out half our wheat crop. And it could do it in a year.

I think we are going to be able to meet the need before that happens, fortunately, but with diseases of that character on us all the time, and with a drought as serious as we have had, we would really be in trouble.

Mr. ANDERSEN. I think, Mr. Marshall, you have asked a very worthwhile question. I feel that, instead of worrying about having some surplus foods, we should be worrying about what would happen if we did not have that food on hand with which to feed the people.

Mr. MARSHALL. Back just a comparatively few years ago we had quite an adequate surplus of food and fiber built up, which was a most fortunate thing for the consumers of this country.

Mr. ANDERSEN. You are referring to about 1940.

Mr. MARSHALL. Yes.

Mr. ANDERSEN. Had it not been for the cotton and the corn which was on hand at that time, we might have been in real difficulty throughout the period of World War II.

Mr. MARSHALL. And if industry had been as farsighted as agriculture was at that particular time in building up a stockpile of steel and other minerals, how much less would have been the cost to the consumers of this country.

UNSOUND PUBLIC CRITICISMS OF GOVERNMENT AGRICULTURE POLICY

Mr. ANDERSEN. That is why, Dr. Shaw, I do not have much patience with the so-called agricultural writers in the press who try to make the people of the Nation believe that we are in a terrific predicament today simply because we do have a rather moderate surplus on hand.

Mr. WHITTEN. Could I interpose something right there?

Mr. ANDERSEN. Yes.

Mr. WHITTEN. What creates the farmer's problem is that he is asked to produce the extra margin of safety, but the Government does not buy it from him. It lets that surplus dangle around the market places, seeking a market and thereby breaks the market for the normal crop. The Government is not treating him as fair as it does the other fellow. When the Government needs a surplus of trucks, or a lot of other things, whatever it may be, that might reduce the market price, they are not allowed to depress the market because the Government buys them at cost plus a profit.

But with regard to the farmer, whatever he produces for the Nation's safety, not only does it result in trouble with surpluses, but the surplus sets the price for the regular crop. It is the only place in Government where we ask any segment of our economy to go in and meet a national need to its own injury.

Mr. ANDERSEN. And another thing, Mr. Whitten, that is made much of, as you know, is where good food is permitted to go to waste or to get in such shape that it is not suitable for human consumption. That is one of the things that we ought not to have.

Mr. WHITTEN. There is no excuse for letting that happen in this country.

Mr. ANDERSEN. But as Mr. Marshall has pointed out, the overall problem that we must look at is the fact that we should have something on hand to prevent a catastrophe if the people in this country were caught without sufficient food to eat. As Dr. Shaw has indicated, we have been fortunate during the last 15 years, with good crops, and lack of any national disasters in the way of droughts. As you have further stated, Dr. Shaw, any one of these disasters such as the wheat rust you have described, could take our wheat crop away in one year.

Dr. SHAW. Yes.

Mr. ANDERSEN. Is there anything further you wish to bring out, Mr. Marshall?

RELATIVE EMPHASIS ON PRODUCTION, UTILIZATION, AND MARKETING RESEARCH

Mr. MARSHALL. Just one further comment: It seems to me we have been fortunate up to this time in that the research people have done a tremendous job in increasing the yield and production of crops.

And I notice that in this request for funds, that it is stated that 62 percent of the funds go for production purposes.

Dr. SHAW. Yes.

Mr. MARSHALL. It would seem to me in connection with the needs for these reserves, not only from the farmer's standpoint, but even more from the consumer's standpoint, that your balance would be out of line, that you would be spending less for production; that it should be the other way around, and I was surprised at the figure that only some 13 percent was in the marketing end.

Mr. HORAN. 38 percent?

Dr. SHAW. 25 percent for utilization; and 13 percent for marketing, a total of 38 percent outside the production field. The marketing item will follow my general statement. The Agricultural Marketing Act, as I pointed out, provides for a separate amount under a separate appropriation for the marketing work. And frankly, I do think we need to do more work in marketing than what we have underway now. I am satisfied there is a lot more that can be done, but we do not have the authority to shift the production money over to marketing.

Mr. MARSHALL. Your figures would look to me as though you might be saying that we are producing without making proper provision for that product after it has been produced. That all goes back, I think, Mr. Chairman, to the question you raised about eggs and the wide spread in prices.

Mr. ANDERSEN. Someday we will be able, maybe, to find the answer to that, but why should there be an increase of 99 percent in the price of a dozen eggs in the market here in Washington, over what it is the very same day in Minnesota?

Mr. WHITTEN. The difficulty is in what can be done about it.

Dr. SHAW. There is one point, Mr. Chairman, in relation to this new land—the immediate requirements for the increased population—and the research program; if we could provide the increased production that we will need by 1975, that is, between 1975 and now, through improvement in production, even if we doubled the research program we would accomplish the equivalent of buying land at about $40 an acre.

If we could do it with the current research program, it would be at about $20 per acre. I do not think we can get it with the current program.

Mr. ANDERSEN. Mr. Horan, you had a question previously that you wanted to ask.

PUBLIC-SERVICE PATENTS

Mr. HORAN. I should like to have the public-service patents and a line of description for each one of them, which the Department got in the last fiscal or calendar year. I believe there are only 85 of them.

Dr. SHAW. Mr. Horan, if it is agreeable with you, Dr. Hilbert will list those patents when presenting his work to the committee.

Mr. HORAN. He will list them?

Dr. SHAW. Yes, sir.

Mr. HORAN. I thought it would be well to have those spread on the record.

Mr. ANDERSEN. That will be fine. Will you have Dr. Hilbert do that?

USE AND VALUE OF AUTHORITY FOR TRANSFERS OF RESEARCH FUNDS

Mr. ANDERSEN. I have one final question along the line of general questioning, Doctor. In 1952 we added language to permit transfers of research funds up to 7 percent. How has this authority been used and has it been of value?

Dr. SHAW. It has been of value, Mr. Chairman.

I should like to give you one particular case in point. We were confronted, as you know, with this new air-sac disease of poultry. It was necessary for us to get going on that rather quickly. The authority which you put in the bill in 1952 was used to transfer money from other work to this air-sac problem. We made a transfer of $117,500 to that work, and utilized this authority in doing it.

I think it is important that we do have the authority to make transfers of this type to help meet some of the emergencies which come up from time to time.

Mr. ANDERSEN. You feel, then, that it does serve a good purpose?

Dr. SHAW. It is very helpful to us; yes, sir.

OFFICE OF ADMINISTRATOR

Salaries and Expenses

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$582,440	$580,677	$367,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," pursuant to 5 U. S. C. 568b	−3,000		
Adjusted appropriation or estimate	579,440	580,677	367,000
Reimbursements from other accounts	7,821	17,000	35,000
Total available for obligation	587,261	597,677	402,000
Unobligated balance, estimated savings	−2,048		
Obligations incurred	585,213	597,677	402,000
Comparative transfer to—			
"Salaries and expenses, Bureau of Human Nutrition and Home Economics, Agricultural Research Administration"	−14,900	−14,500	
"Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration"	−79,000	−76,000	
"Salaries and expenses, Bureau of Dairy Industry, Agricultural Research Administration"	−18,000	−17,300	
"Salaries and expenses, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration"	−93,240	−92,800	
"Salaries and expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration"	−17,210	−15,800	
"Salaries and expenses, Forest Service"	−2,600	−2,300	
"Salaries and expenses, Soil Conservation Service"	−11,600	−10,800	
"Marketing services, Production and Marketing Administration"	−9,700	−9,500	
Total obligations	338,963	358,677	402,000

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Administration and over-all direction of the Agricultural Research Administration	$331,142	$341,677	$341,677
2. Multiple-purpose buildings and improvements, Agricultural Research Center			25,323
Total direct obligations	331,142	341,677	367,000
Obligations Payable Out of Reimbursements From Other Accounts			
1. Administration and over-all direction of the Agricultural Research Administration	7,821	17,000	35,000
Total obligations	338,963	358,677	402,000

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	48	47	47
Average number of all employees	43	44	46
Average salaries and grades:			
General schedule grades:			
Average salary	$6,611	$6,773	$6,788
Average grade	GS–9.1	GS–9.5	GS–9.5
Personal service obligations:			
Permanent positions	$286,776	$300,400	$309,200
Part-time and temporary positions	2,323	300	
Regular pay in excess of 52-week base	984	1,200	1,200
Payments to other agencies for reimbursable details		2,000	
Total personal service obligations	290,083	303,900	310,400
Direct Obligations			
01 Personal services	282,262	292,500	292,500
02 Travel:			
Advisory committees	25,749	26,000	26,000
Agency personnel	8,564	9,000	9,000
03 Transportation of things	156	200	200
04 Communication services	2,381	2,500	2,500
05 Rents and utility services	10		
06 Printing and reproduction	9,588	8,000	8,000
07 Other contractual services	88	100	10,600
Services performed by other agencies	778	800	9,700
08 Supplies and materials	1,531	1,600	1,600
09 Equipment		977	900
10 Lands and structures			6,000
15 Taxes and assessments	35		
Total direct obligations	331,142	341,677	367,000
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	7,821	11,400	17,900
02 Travel		1,000	2,000
06 Printing and reproduction		600	11,400
07 Other contractual services: Services performed by other agencies		1,800	3,300
08 Supplies and materials		500	400
09 Equipment		1,700	
Total obligations payable out of reimbursments from other accounts	7,821	17,000	35,000
Total obligations	338,963	358,677	402,000

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$222,693	$100,917	$99,994
Obligations incurred during the year	585,213	597,677	402,000
	807,906	698,594	501,994
Deduct:			
Reimbursable obligations	7,821	17,000	35,000
Unliquidated obligations, end of year	100,917	99,994	49,994
Adjustment in obligations of prior years	6,567		
Obligated balance carried to certified claims account	1,241		
Total expenditures	691,360	581,600	417,000
Expenditures are distributed as follows:			
Out of current authorizations	488,347	490,000	325,000
Out of prior authorizations	203,013	91,600	92,000

Mr. ANDERSEN. We will insert in the record at this point pages 67 and 72 through 77 of the justifications.

(The material referred to follows:)

AGRICULTURAL RESEARCH ADMINISTRATION—OFFICE OF ADMINISTRATOR

SALARIES AND EXPENSES

Appropriation Act, 1953	$581,000
Activities transferred in 1954 estimates for certain services and supervision of reimbursable activities at the Agricultural Research Center as shown in detail below	−239,000
Reduction pursuant to section 411	−323
Base for 1954	341,677
Budget estimate, 1954	367,000
Increase (for alterations to buildings and for reconditioning roads at the Agricultural Research Center)	+25,323

Project statement

Project	1952	1953 (estimated)	Increase or decrease	1954 (estimated)
1. Administration and overall direction of the Agricultural Research Administration	$331,142	$341,677		$341,677
2. Multiple-purpose buildings and improvements, Agricutural Research Center			+$25,323	25,323
Unobligated balance	2,048			
Total available or estimate	333,190	341,677	+25,323	367,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration"	+3,000			
Transfer in 1954 estimates to:				
"Salaries and expenses, Bureau of Human Nutrition and Home Economics"	+14,900	+14,500		
"Salaries and expenses, Bureau of Animal Industry," animal research	+79,000	+76,000		
"Salaries and expenses, Bureau of Dairy Industry"	+18,000	+17,300		
"Salaries and expenses, Bureau of Plant Industry, Soils, and Agricultural Engineering," plant, soil, and agricultural engineering research	+93,240	+92,800		
"Salaries and expenses, Bureau of Entomology and Plant Quarantine," insect investigations	+17,210	+15,900		
"Salaries and expenses, Forest Service," forest research	+2,600	+2,300		
"Salaries and expenses, Soil Conservation Service"	+11,600	+10,800		
"Marketing services, Production and Marketing Administration"	+9,700	+9,500		
Reduction pursuant to sec. 411		+323		
Total appropriation or estimate	582,440	581,000		

STATUS OF PROGRAM

Administration and overall direction of the Agricultural Research Administration

The Administrator, with the assistance of his immediate staff, is responsible for planning, coordinating, and directing the research program and the control and regulatory programs of the Agricultural Research Administration; is responsible for research activities (other than economic research) of all other agencies of the Department; and develops, in cooperation with directors of State and Territorial Agricultural Experiment Stations and 21 RMA advisory committees, and in the light of research conducted by other public agencies and private industry, an integrated research program which will best meet the changing needs of agriculture and the Nation's requirements for food, feed, and fiber.

The major activities in 1952 were as follows:

(*a*) The integration and coordination of research activities continued to be the major activity of the staff. The advisory committees established under authority of the Research and Marketing Act have been kept informed and consulted with regard to the entire program of research and marketing service in their respective areas of work, and their recommendations actively considered in program formulation.

Quarterly meetings were held with the Agricultural Research Policy Committee. The committee made recommendations for improving the effectiveness of the work of commodity and functional advisory committees, including a suggestion that in the future, more meetings be held at field stations. In order to have advisory committee consideration of problems and areas of work not heretofore covered by committees, the Agricultural Research Policy Committee recommended that additional committees be established to advise in the fields of (*a*) forestry, (*b*) soils, water, and fertilizers, and (*c*) production economics. These additional committees are in the process of being established and will hold meetings in fiscal year 1953.

Meetings, usually of 3-day duration, were held with the various commodity and functional advisory committees. Members of the staff served as executive secretaries to the committees, arranged for the required facilities, prepared condensed progress reports on selected work of interest to each committee, listed problems or fields of work for their consideration, secured participation by Departmental specialists, recorded the actions taken and the recommendations made, and prepared and distributed the final reports approved by the committees.

The executive secretaries of advisory committees kept committee members currently informed of the results of research by forwarding publications and special reports as they became available. Contacts were continued with special industry or commodity groups to inform them of progress in their fields of interest. Members of the staff also served as chairmen to approximately 18 working groups of technical subject-matter specialists within the Department.

The chairmen of each of the advisory committees held one joint meeting at which they developed helfpul recommendations regarding the operation of the individual advisory committees.

Recognizing that most of the committees deal with individual commodities and that their recommendations tend to emphasize applied research, the chairmen as a group recommended that there also be a stronger program of basic research. They also recommended to the Agricultural Research Policy Committee a statement of criteria for evaluation of research proposals which was approved by that committee and has been helpful to committees and research personnel in their work of program development.

A comprehensive index has been prepared and printed for the report on research and related services of the Department originally published in fiscal year 1951 at the request of the House Committee on Agriculture.

A new policy and procedure statement was issued for departmental use as a guide for negotiating and preparing RMA contracts. The procedure has facilitated the negotiation, clearance, and execution of these contracts, and has served as a basis for more uniform provisions to further the Government's interests.

(*b*) A special assistant to the Administrator continued to spearhead and expedite all ARA activities related to defense. Such activities have been extensive and varied, including development of the research program on strategic and critical agricultural materials in consultation with the Munitions Board; direction of the planning of programs to protect the Nation's crops and livestock against the hazards of biological warfare in cooperation with the Federal Civil Defense Administration; participation in departmental and interdepartmental determinations of production goals, requirements, allocations, and allotments of products relating to agriculture; and general liaison with the Production and Marketing Administration of the Department, the Department of Defense, the Office of Defense Mobilization, and other emergency agencies.

(*c*) The Research Administrator served as a member of the Interdepartmental Committee on Scientific Research and Development, and members of the Administrator's staff served on the Subcommittees on Scientific Personnel and on Budgetary Procedures. Staff members also served on many important national committees, such as the Advisory Committee for Scientific Research of the Textile Research Institute, the Joint USDA-Land-Grant College Committee on Agricultural Services to Foreign Areas, the Committee on Specialized Personnel of the Office of Defense Mobilization, the Food and Nutrition and the Agricultural Boards of the National Research Council, the Government Patents Board, and the National Forest Advisory Board of Appeals; and as consultants to the Atomic Energy Commission, to the Research and Development Board and the Munitions Board of the Department of Defense.

(*d*) An extensive report dealing with the toxicity of insecticides, fungicides, and herbicides was released this year. The report was the result of the work of a research panel and is intended to provide a technical guide to research development in this important field.

(*e*) The Central Project Office continued to serve the Department through the performance of four essential functions:

It serves as a central control for routing and clearance of proposals to initiate, modify, and discontinue research, marketing service, and statistical projects.

It maintains by means of comprehensive agency and subject matter files a readily available store of information on about 4,100 current departmental projects in these fields.

It prepares analyses of the current research program of the Department, both as a whole and in particular commodity or functional fields, to reveal points of overemphasis and underemphasis, possible duplication of effort, and opportunities for cooperative endeavor among different agencies.

It prepares descriptive summaries of research in particular fields for the use of advisory committees, research workers in the Department and in State agricultural experiment stations, research coordinators, and the public at large.

The quantitative analysis of the Department's $45 million research program during fiscal year 1951 was extended during fiscal year 1952, in cooperation with the Office of Experiment Stations and the States, to include the $63 million program of agricultural research being conducted at the State agricultural experiment stations. A more complete picture was also provided by presenting the combined programs of State and Federal research which, during fiscal year 1951, involved total expenditures of more than $108 million. These graphically portrayed studies helped visualize the relative emphasis being given to various lines of research work carried out by the Department and the State agricultural experiment stations.

During the latter half of fiscal year 1952, control procedures for routing and clearance of projects were simplified and provisions made for more adequate interchange of research plans between the agencies of the Department engaged in research. These changes were made in response to the memorandum of November 13, 1951, issued jointly by the Administrator, Agricultural Research Administration, and the Chief, Bureau of Agricultural Economics, delegating responsibility for line project approval to the originating bureaus and agencies concerned. This shifting of responsibility enables the staff of the Administrator, ARA, to give additional emphasis to improving the quality of research program planning, to obtaining a higher degree of integration between research agencies, and to the avoidance of duplication in research.

Considerable improvement was also made in streamlining the system of annual reporting on progress in research. As a result of careful study with the agencies concerned, paper work has been significantly reduced and the reports timed to provide up-to-date information at the periods during the year when it is most urgently needed.

The following figures indicate that part of the workload of the central project office which is measurable:

	1951	1952
Projects in force at end of fiscal year:		
Financial	132	133
Work	747	602
Line	3,305	3,362
Total	4,184	4,097
Changes in financial, work, and line projects during fiscal year:		
Projects added to the file	835	855
Projects extended	258	261
Projects discontinued	496	347
Projects superseded	277	535

Working capital fund, Agricultural Research Center

This working capital fund is a continuing operating fund of $300,000 established by the 1951 Agricultural Appropriation Act to pay the operating costs of certain centralized services and facilities at the Agricultural Research Center pending receipt of reimbursements for such costs from the bureaus and agencies provided with the services. The integrity of the original appropriation is maintained from year to year by means of these reimbursements.

Statements reflecting the assets and liabilities and income and expense of the working capital fund as of June 30, 1952, as well as estimates for 1953 and 1954, are printed in the budget schedules and in the subcommittee print for the fiscal year 1954.

Statement of obligations under allotments and other funds

(Includes only those amounts which, by Nov. 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases.)

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, agriculture (Office of Administrator, Agricultural Research Administration):			
For overall administration, planning, and coordination of research under the Agricultural Marketing Act	$108,610	$135,800	$135,800
Inventory and analysis of agricultural research, marketing service, and statistical projects	11,583	12,000	12,000
Publication of research progress and results under the Agricultural Marketing Act		3,000	3,000
Total, Agricultural Marketing Act	120,193	150,800	150,800
Mutual Security (allocation to agriculture) (Office of Administrator, Agricultural Research Administration): For expenses incident to the foreign trainee program	118,409	89,330	
Working funds, agriculture, general (Office of Administrator, Agricultural Research Administration), advanced from Department of State: For expenses incident to the foreign trainee program		43,700	
Obligations under reimbursements from governmental and other sources:			
Salaries and expenses	7,821	17,000	35,000
Agricultural Marketing Act	1,659		
Total, obligations under reimbursements from governmental and other sources	9,480	17,000	35,000
Total obligations under allotments and other funds	248,082	300,830	185,800

MULTIPLE-PURPOSE BUILDINGS AND IMPROVEMENTS, AGRICULTURAL RESEARCH CENTER

Mr. ANDERSEN. Will you discuss those four small increases, in the Office of the Administrator, please.

Dr. SHAW. If it is agreeable with you, Mr. Chairman, I would like to have Mr. Spencer discuss those increases. They all relate to the agricultural research center.

Mr. ANDERSEN. Mr. Spencer, we would be glad to hear from you.

Mr. SPENCER. Thank you, Mr. Chairman.

These increases are all in the nature of nonrecurring physical improvements.

Items of that sort, despite the transfer of the reimbursable items, will be handled on a direct appropriation basis, as in the past. If we can look at these pictures as we go along, I think it will help you follow the items.

SOLVENTS STORAGE BUILDING

The first proposal is an item of $6,000 for an addition to the solvents storage building, a small brick building of approximately 600 square feet. The interior view, which is the second picture [indicating], is not a particularly clear picture, but it does show the way in which the materials are enclosed, and gives some idea of the height of the building.

This building is used for the storage of inflammable chemicals, which are stored in rather large containers—50-gallon drums, or in the case of bottled materials, usually in 48-bottle cases.

The space has become so crowded that it is necessary to store in layers. Particularly in the case of drums, that makes it rather difficult to get material out of storage.

Mr. ANDERSEN. Let me ask you a question about that specific item, Mr. Spencer.

Would there not be a sufficient saving of time and other costs by this addition to the solvents storage building to cover the additional cost?

Mr. SPENCER. There would be a mechanical difficulty there, I think, Mr. Andersen, in view of the present method of appropriation, in that we would have no very fair basis on which to charge capital improvements on a reimbursable basis. Over a period of time there would be an appreciable saving.

Mr. ANDERSEN. Go ahead with your presentation.

Mr. SPENCER. I believe I pointed out that it was a wasteful method of handling, and we often have to assign two men to a job where one man could do it if he could get at the material.

That, in turn, leads to another difficulty. There has been a tendency on the part of the bureaus to carry more of this type of material as laboratory supplies than is strictly desirable from the safety standpoint.

The only alternative to adding to this building would be an open compound which we would enclose with wire and where we would store materials out of doors. That is not very good from the standpoint either of safety or of the danger from theft.

Mr. ANDERSEN. You do think you could dispense with the service of one or more employees if you could have this new building; is that right? I notice in your justification you say:

> The present crowded storage conditions sometimes require the services of 2 or more employees to withdraw chemicals from storage, whereas provision of proper facilities would make it possible for 1 employee to do this work in most cases.

Mr. SPENCER. These men, of course, are not used exclusively to draw material from storage.

Mr. ANDERSEN. No.

Mr. SPENCER. It undoubtedly would cut down the time devoted to that particular process, but it is by no means every day that we have to send down and draw items from stock.

HIGHWAY SURFACING

Mr. ANDERSEN. Please discuss item No. 2. I note there is $10,923 for a heavier surface for a portion of the East-West Highway.

Mr. SPENCER. Yes, sir. We regard that as a very urgent item.

An examination of the chart which is next in your picture file I think will make that clear.

This has to do with the East-West Highway, which is the main route through the Research Center, running from the present Washington-Baltimore Boulevard to the Laurel-Bowie Road.

You will note the cross section in the middle which indicates where the Washington-Baltimore Parkway will come through the Center. As you can see, just about halfway along the East-West Highway, there is to be a cloverleaf with approaches to the parkway.

Now, the section which is indicated in crosshatch is a concrete road. The heavy black section is a bituminous plant-mix surface. There is approximately 2 miles which is now in that section.

Mr. ANDERSEN. Mr. Spencer, at that point let me ask you this: How was that financed, the particular portion which has already been resurfaced?

Mr. SPENCER. That was financed from the old appropriation of the Office of the Administrator.

Mr. ANDERSEN. It was?

Mr. SPENCER. Yes, sir. What we propose now is to add to this section in white the same type of surfacing, approximately a 2-inch bituminous mix, which we now have on the heavy section. This will bring the heavy surfacing up to the parkway access point, a necessity if the road is to stand up under the heavier traffic which will undoubtedly come with the opening of the parkway.

The next two photographs will illustrate. The first is the road as it is now, the one where the truck is just disappearing in the distance. The other one is the section as we propose to make it.

RECONDITIONING OF ROAD

Mr. ANDERSEN. What about the $5,800 for reconditioning the road to the North Farm?

Mr. SPENCER. That one, Mr. Chairman, is a road which leads into these dual-purpose houses which were discussed a while ago, the ones which were built as demonstration farm housing and which are occupied by dairy workers.

Even while those houses were under construction, we found there was a good bit of public interest, such as visiting county agents and farm groups who wanted to go back there and see what was going on. With their completion, the use made of that road will be stepped up even more.

As you can see, it is really just a lane. It gets badly pitted, and raises clouds of dust in dry weather. It is not at all a desirable approach with the number of people who will be coming in there.

Mr. ANDERSEN. Does that road lead to the group of houses and nothing else?

Mr. SPENCER. There are also some dairy farm buildings back there.

Mr. ANDERSEN. After all, we would not want to spend too much money just to fix up a road over which a very few people would travel. But you say there is quite a bit of traffic?

Mr. SPENCER. Yes.

Mr. ANDERSEN. Do you think it would justify the $5,800?

Mr. SPENCER. Yes, sir; we do.

Mr. ANDERSEN. How long is that piece of road?

Mr. SPENCER. Five-eighths of a mile.

Mr. ANDERSEN. Five-eighths of a mile. Will you proceed to the next item.

FEEDER LANE

Mr. SPENCER. The fourth item has to do with improving a condition where a feeder lane runs into the East-West Highway. As you can see from the picture, our principal difficulty there is the extremely steep grade at which that intersection comes in.

The East-West Highway is a high-speed road. We have had some minor collisions there. Fortunately, we have never had a serious accident.

We have also had some cases of cars turning from the East-West Highway into the lane, miscalculating and running into the ditch. What we want to do is to reduce the grade and widen the angle of approach there. This can be done for $2,600.

Mr. ANDERSEN. Would you not consider that this particular item should take precedence over No. 3, from the safety viewpoint alone?

Mr. SPENCER. Yes, sir; I think we would.

Mr. ANDERSEN. I would think so, glancing at the picture. The other might be inconvenient, but here somebody might be killed.

Mr. SPENCER. I think you are right, Mr. Chairman.

CHANGE IN METHOD OF FINANCING ACTIVITIES AT THE AGRICULTURAL RESEARCH CENTER

Mr. ANDERSEN. Mr. Spencer, has the working capital fund, which was established several years ago, proved to be satisfactory?

Mr. SPENCER. It has been one of the best devices we have ever had, Mr. Chairman, to handle our work there.

Mr. ANDERSEN. To refresh our minds, how much is in that particular working capital fund?

Mr. SPENCER. The fund was established at $300,000, and that turns over from 5 to 6 times in the course of a year.

Mr. ROBERTS. The first fund established was for the central Department services. This one was later authorized to serve the same purpose at Beltsville.

Mr. ANDERSEN. As you perhaps know, the Congress has an aversion to these funds over which it does not have direct control. In this instance, however, it is working out well; is that right, Mr. Roberts?

Mr. ROBERTS. I should like to make it clear that in this case, Mr. Chairman, you do have control over this fund. The fund was established to provide cash for operations performed on a service basis and pending the time when the agency requesting the service could be billed. When those billings go out, the charges are made against the appropriations which you people are considering here, the appropriations of the various bureaus of the ARA and 1 or 2 other agencies such as the Forest Service, which have operations out at Beltsville.

Thus when you review the appropriations of the Agricultural Research Administration you are reviewing the funds that are expended through this account; you do have control over the moneys which are spent from the working fund. It is only that they are spent through the working capital fund in order that the work can be performed as needed, and appropriately distributed back to the agencies receiving the service at Beltsville.

ALLOTMENTS AND TRANSFERS

Mr. ANDERSEN. Dr. Shaw, I should like to have a little discussion relative to the allotments and transfers from other funds in your office.

Dr. SHAW. We have allotments of around $150,000 from the Agricultural Marketing Act for overall administration, to help service the advisory committees and the regular program coordination as related to this particular Agricultural Marketing Act work.

That administration is performed centrally in my office for all the work under the Agricultural Marketing Act in the Department.

We get allotments from the Mutual Security Agency to carry on work with foreign visitors in this country, visitors who are coming over here to look at our scientific work at Beltsville, at various field locations, and at the State agricultural experiment stations. We are providing services to aid these foreign visitors to get information about our work, and then to carry it back with them to their home countries, to be of benefit to the other countries.

Mr. ANDERSEN. I note you have nearly $90,000 this fiscal year in such transfers on that particular item, do you not?

Dr. SHAW. It is the sum of those first 2, the $89,000 and the $43,700.

Mr. ANDERSEN. I see. That would be $132,700.

Dr. SHAW. Yes. The other item there, Mr. Chairman, of $17,000 in 1953 and an estimated $35,000 in 1954, is moneys which are assessed to the bureaus for the financing of this research progress report, the agricultural journal which I showed you previously.

INFORMATION OFFICE

Mr. ANDERSEN. Will you give us a short discussion relative to the work of the eight people in your Information Office?

Dr. SHAW. First of all, we have the problem of coordination of the entire information program on research. All of the work of the bureaus publishing bulletins include editorial work in terms of seeing that all of these bulletins are in conformity with Department policies, style, and so forth.

Mr. ANDERSEN. Would you say, then, that they work rather closely with what is known as the central project unit which you discussed previously?

Dr. SHAW. They are working with that unit and all the bureaus' offices to coordinate the overall informational work of the bureaus.

They also are engaged in the work related to this research publication. Two of them and a secretary are working on that. Also, they do some work on releases related to our control and regulatory activities, as well as our research activities. Their work cuts clear across the board, research and control and regulatory activities as well.

I think that one of the troubles concerning all of us is getting our research results out as fast as we have them developed. If we are going to do that it is necessary to have a small information staff working with us, to try to get it done.

Each of the ARA bureas has its information and editorial office, which takes care of the day-to-day operations in getting research results to farmers and the general public. Much of our research, however, is cooperative between bureas or otherwise crosses bureau lines. It is in this field that overall direction and coordination is necessary, and we are trying to accomplish it with the following staff:

Information coordinator, GS–14, secretary, GS–5: Duties of the information coordinator are to coordinate the reporting of research and other activities of the Agricultural Research Administration; to advise the Administrator, bureau chiefs, and other officials of ARA on public-information programs and policies; to plan and supervise preparation of annual reports, special reports, speeches, articles, and statements for the Administrator, Deputy Administrator, and Assist-

ant Administrator; to answer inquiries from the public on the work of ARA; to review the work of other writers and editors in the Office of Administrator. The secretary, of course, performs the usual duties of such a position.

Research writer, GS–13: Duties of this position include general assistance and followup on coordination of research information. The incumbent also prepares reports, speeches, and official articles for the Administrator; assists ARA bureaus in publication problems; helps in answering inquiries from the public; and prepares special articles for farm-organization publications.

Research writer, GS–12: Duties are almost entirely concerned with reporting work under the Agricultural Marketing Act (title II, Research and Marketing Act) and include review and clearance with proper officials of the Agricultural Research Administration of all manuscripts on marketing research; preparation of annual reports and special reports on work under the Agricultural Marketing Act; and preparation of news releases on recommendations of advisory committees.

Research writer, GS–9: The duties of this position are primarily to assist the information coordinator in the preparation of special reports, articles, and statements for the Administrator. In addition, the incumbent prepares articles on the work of ARA for the Extension Service Review and outside publications; prepares scripts for radio programs on the Farm and Home Hour; and serves as technical editor for all material published by the Office of Administrator.

Research writer, GS–13, research writer, GS–11, editorial clerk, GS–5: Duties are primarily to plan, write, illustrate, and edit articles for the monthly progress report Agricultural Research. This includes supervising publication and distribution of the report, and establishing cooperative relations with State agricultural experiment stations and similar groups engaged in agricultural research. The monthly report has a circulation of 25,000 copies (in addition to paid subscriptions handled by the Superintendent of Documents), which go to agricultural leaders in the fields of research, extension, and teaching, to commodity and other agricultural trade associations, scientific societies and institutions, libraries, the farm press, agricultural research groups in industry, and to other groups or individuals directly concerned with agricultural research.

ADMINISTRATIVE MANAGEMENT UNIT

Mr. ANDERSEN. I wish you would describe the function of each position in your Administrative Management Unit. I notice you have 10 such positions.

Dr. SHAW. My conviction is that if I am to do an effective job of administering the research program of the Department the scope of my work must include administrative management as well as program operations, and that this cannot be done without a competent administrative staff. It should be emphasized that the duties of this group relate not merely to the operation of the Office of Administrator but to the operations of the entire Agricultural Research Administration. In my opinion the present staff is the very minimum which should properly be assigned to this field. These are the specific jobs:

Assistant Administrator, Management, grade GS–15; administrative assistant, grade GS–7.

The Assistant Administrator, Management, is my principal assistant in this field. He works with and represents me throughout the entire field of organization and management, involving many program matters as well as business operations. In this capacity he deals with agencies within and without the Department, with other Federal agencies, with public and private cooperators, and with industrial organizations. He also advises and cooperates with the chiefs and administrative officers of the various bureaus of the Agricultural Research Administration in the development of administrative policies and procedures and the handling of specific problems in their respective fields. The purpose is to bring about common policies and procedures so far as possible and to provide a close liaison between the bureaus and the Office of Administrator on problems which are peculiar to a particular bureau but which are of such importance as to require the consideration and interest of the Administrator. The incumbent of this position also serves as the Department's contracting officer in the execution of contracts under the Agricultural Marketing Act. This involves continuous contact both with the various Bureaus and with prospective contractors throughout the process of negotiating and completing execution of the numerous contracts in which the Department enters. The position also involves certain final decisions in connection with internal administrative matters, and responsibility within the Office of Administrator for operations at the Agricultural Research Center.

The duties of the administrative assistant position involve the usual secretarial duties and also the collection and compilation of administrative material for the use of the Assistant Administrator.

Personnel management and organization officer, grade GS–14; secretary, grade GS–5: The personnel management and organization officer is responsible for the coordination of ARA activities in the field of personnel management. Each of the bureaus within the Agricultural Research Administration has its own personnel organization and handles directly its own personnel operations. It is necessary, however, to have a focal point at which can be handled not only particularly difficult problems peculiar to each bureau but also those areas of concern to ARA as a whole. Examples of such problems are the recruitment of scientific personnel, position classification, training, and the development of performance standards. In addition to this direct contact with the Bureau personnel officers, the incumbent of this position works with the Assistant Administrator for Management and myself in the clearing of cases which must have our attention and in the determination of policies and procedures which must be decided at this level.

The GS–5 position involves the usual secretarial duties.

Budgetary and fiscal officer, GS–14; budget officer, GS–12; administrative assistant, GS–9; administrative assistants (2), GS–7: These positions constitute the staff of the budget office. The responsibilities of this office include (1) the preparation and processing of the budget estimates for the Office of Administrator; (2) the preparation and processing of the budget estimates for the Agricultural Marketing Act, which involves the collection and compilation into a single estimate of material received from the many different agencies in the

Department conducting projects under allotments of Agricultural Marketing Act funds; (3) the review, analysis, and correlation of the budget estimates for the various bureaus of the Agricultural Research Administration, which involves constant contact with those agencies, and also assistance to me as Administrator in the review of estimates, resulting in final decisions as to the amounts to be requested for the various items; (4) the preparation of numerous budgetary and financial reports, most of which include material collected from all ARA bureaus and put together in consolidated form either for use in the Office of Administrator or for submission to the Bureau of the Budget, various committees of Congress, or other Federal agencies such as, for example, the National Science Foundation. The incumbent of the grade GS–14 position, in addition to his participation in the above functions, also works with me and with the Assistant Administrator for Management in planning and effectuating policies and procedures in the budgetary and fiscal field throughout the Agricultural Research Administration.

Administrative assistant, GS–9: The incumbent of this position is responsible for the preliminary review of proposed Research and Marketing Act contracts. This involves making sure that proposals have had proper clearances from the program, legal, and fiscal offices within the Department and that any points which seem to require clarification or special consideration are brought to the attention of the contracting officer. An additional duty is the maintenance of records involving both funds and subject matter relating to pending and executed contracts. The remainder of this employee's time, which really is not properly chargeable to administrative management, is devoted to the servicing of the various research advisory committees. This assignment involves working both with the committees themselves and particularly with the various executive secretaries.

BUSINESS SERVICES UNIT

Mr. ANDERSEN. Dr. Shaw, please describe the function of each of the positions in your Business Services Unit, where you show eight positions.

Dr. SHAW. This group includes 1 position in GS–7, 1 in GS–5, 3 in GS–4, 1 in GS–3, and 2 in grade 3 of the crafts, protective, and custodial service. The function of the Unit is to handle the routine business operations of the immediate office of Administrator. The GS–7 employee is in charge of the office and, in addition to supervising its operations generally, is immediately responsible for personnel work. The grade GS–5 employee is responsible for the procurement and related activities of the office and assists in other operations as needed. Two of the GS–4 employees are actually assigned to the Bureau Accounting Services of the Office of Budget and Finance, which does the accounting work for the Office of Administrator. The other GS–4 employee and the GS–3 employee are assigned to the maintenance of the files and the operation of the mailroom of the office. The files are somewhat more complicated than would normally be the case in an office of this size because of the wide range of subject matter. The two CPC employees are assigned to messenger work and to certain labor operations, such as moving furniture within the immediate office.

ADMINISTRATIVE SERVICES UNIT AT THE AGRICULTURAL RESEARCH CENTER

Mr. ANDERSEN. What function does the Administrative Services Division perform at the Beltsville Center?

Dr. SHAW. Mr. Spencer can answer that.

Mr. ANDERSEN. Mr. Spencer.

Mr. SPENCER. The Administrative Services Unit at the Research Center is in charge generally of records, building management, and custody. That is, the guard service, the men engaged doing what road patrol we are able to do, and the ones who are responsible for the condition of the buildings generally.

Perhaps if you have been looking at the figures on property management you have gotten the impression that there was a tremendous amount of work put into property management at the center. That is due largely to the definition of "property management" under the budgetary instructions, which require that we include the plumbers, electricians, carpenters, and others engaged in building maintenance.

Mr. ANDERSEN. Dr. Shaw, I notice from your detail of "Personal services" that 40 out of some 200 people at Beltsville are in the Administrative Unit. That is 20 percent.

Do you include the electricians and such men in that particular 40?

Mr. SPENCER. Mr. Struttmann, on the distribution of your chart, is that the case?

Mr. STRUTTMANN. You are not thinking of property management now. You are looking at this from the viewpoint of administrative services in the broad sense.

Those are primarily the people in the Administrative Office. There are a few crafts, protective, and custodial in that group, but it is not the large group of people taking care of the buildings.

Mr. ANDERSEN. I am referring to these 40 who can be classified as purely administrative.

Mr. STRUTTMANN. A great deal of that will be in the accounting and personnel field. There is quite a bit of accounting in connection with this working-capital fund; the keeping of records of stores, preparing bills for services performed for the agencies, collecting the money, depositing it, and so forth. There is also quite a bit of purchasing activity and there is a considerable personnel activity.

There is a heavy turnover in the Research Center among the personnel. That is for two different reasons. One is that there is always a high turnover in any agency which employs a lot of people in the crafts grades. Over and above that, there is seasonal activity out at the center which involves a great deal of hiring at the summer season.

Mr. ROBERTS. I think it should be made clear, Mr. Struttmann, that the personnel work you are talking about is the personnel work involved in employing day labor and that sort of staff, which is maintained at the center. It is not the employment of the research staff and so forth for the various bureaus.

Mr. STRUTTMANN. That is correct.

Mr. ANDERSEN. Do you not consider the 20-percent figure a little high?

UNIQUE NATURE OF ADMINISTRATIVE SERVICES ACTIVITY

Mr. STRUTTMANN. In a normal operation 20 percent would be high, but you have to remember that this is a working-capital fund, and there is a great deal of billing and collecting of funds. One and one-half million dollars is billed a year. That is in small units. There are no big $100,000 billings there; instead, there are a lot of small jobs. That does run the cost of the administrative services up above what it would be in a normal operation. There are a number of other activities included in the administrative services division, such as centralized mail and messenger service for the entire Research Center central switchboard service with five operators, and issue clerks at the mechanical shops, warehouse, and the granary.

Mr. SPENCER. I had not intended to give the impression that these mechanics I was talking about were in the Administrative Division. I thought that figure also had come to your attention, and I was speaking to that point rather than the one you had in mind.

Mr. ANDERSEN. They would not be, of course.

Gentlemen, are there any questions before we get into the Agricultural Marketing Act?

INCREASED APPROPRIATIONS

Mr. MARSHALL. I notice in the committee print that the funds for your Department have increased about three times since 1944. I think that is an indication of the interest which this subcommittee has shown in research, and the value of it.

There seems to be some impression afloat that the Appropriations Committee has been pinching research. I do not think those figures show that in the least bit.

Mr. STRUTTMANN. May I comment on that, Mr. Marshall?

Since 1944 Government salaries, of course, have increased considerably; so, you would expect the figure to about double itself. In addition, at this time we have in our office the authority for administration of the Research and Marketing Act, which we did not have back in 1944.

The first appropriation was made in 1948. So, you have a slightly different office now than you had back in 1944, and you have this factor of the increased Government salaries.

Dr. SHAW. The Secretary has assigned a number of responsibilities to us since the Agricultural Research Administration was created in 1942. One of them is to coordinate all of the research of the Department, rather than to just take in the Agricultural Research Administration. Then, as Mr. Struttmann said, when the Research and Marketing Act was passed in 1946, that was not assigned to our office until about 1948. Each of those activities has caused our expenses to rise.

Mr. MARSHALL. I am glad to have the explanation. Do you infer from that, however, that this subcommittee has been niggardly in the money you have been given for appropriations for your office?

Dr. SHAW. No, sir; I do not intend it to infer that. I think the subcommittee has been very helpful and has been considerate of the needs of our program.

Mr. ANDERSEN. Are there any other questions on this item? If not, we will turn to the Agricultural Marketing Act.

TUESDAY, MARCH 3, 1953.

AGRICULTURAL MARKETING ACT

WITNESSES

DR. H. C. TRELOGAN, ASSISTANT ADMINISTRATOR, MARKETING PROGRAMS, AGRICULTURAL RESEARCH ADMINISTRATION
ROBERT M. WALSH, DEPUTY ASSISTANT ADMINISTRATOR, MARKETING PROGRAMS, AGRICULTURAL RESEARCH ADMINISTRATION
O. V. WELLS, CHIEF, BUREAU OF AGRICULTURAL ECONOMICS
ROY W. LENNARTSON, ASSISTANT ADMINISTRATOR FOR MARKETING, PRODUCTION AND MARKETING ADMINISTRATION
WILLIAM C. CROW, DIRECTOR OF THE MARKETING AND FACILITIES RESEARCH BRANCH, PRODUCTION AND MARKETING ADMINISTRATION
DR. B. T. SHAW, RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION
E. L. STRUTTMANN, BUDGETARY AND FISCAL OFFICER, AGRICULTURAL RESEARCH ADMINISTRATION
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$4,962,000	$5,249,333	$5,500,000
Reimbursements from non-Federal sources	421		
Reimbursements from other accounts	30,999		
Total available for obligation	4,993,420	5,249,333	5,500,000
Unobligated balance, estimated savings	−84,451		
Obligations incurred	4,908,969	5,249,333	5,500,000

NOTE.—Reimbursements from non-Federal sources above are from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Marketing costs, margins, and efficiency	$786,280	$826,400	$848,000
2. Improvement and evaluation of product quality	1,151,196	1,230,300	1,338,000
3. Improvements in market organization and facilities	1,733,360	1,842,933	1,902,600
4. Collection, analysis, and dissemination of market data	1,043,082	1,155,300	1,217,000
5. Over-all administration	163,631	194,400	194,400
6. Obligations under reimbursements from non-Federal sources	421		
Total direct obligations	4,877,970	5,249,333	5,500,000
Obligations Payable Out of Reimbursements From Other Accounts			
1. Marketing costs, margins, and efficiency	972		
2. Improvement and evaluation of product quality	2,500		
3. Improvements in market organization and facilities	2,493		
4. Collection, analysis, and dissemination of market data	23,375		
5. Overall administration	1,659		
Total obligations payable out of reimbursements from other accounts	30,999		
Obligations incurred	4,908,969	5,249,333	5,500,000

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	567	589	617
Full-time equivalent of all other positions	18	30	33
Average number of all employees	524	559	586
Average salaries and grades:			
General schedule grades:			
Average salary	$4,879	$4,907	$4,910
Average grade	GS–7.1	GS–7.1	GS–7.0
Personal service obligations:			
Permanent positions	$2,554,149	$2,745,018	$2,894,426
Part-time and temporary positions	89,153	77,138	82,758
Regular pay in excess of 52-week base	9,653	10,863	11,457
Payment above basic rates	6,991	9,595	13,475
Payments to other agencies for reimbursable details	19,200	19,750	19,750
Total personal service obligations	2,649,146	2,862,364	3,021,866
Direct Obligations			
01 Personal services	2,633,994	2,862,364	3,021,866
02 Travel	185,995	240,000	255,450
03 Transportation of things	7,609	11,830	15,250
04 Communication services	23,907	28,170	29,350
05 Rents and utility services	23,005	24,900	25,100
06 Printing and reproduction	81,522	104,285	108,385
07 Other contractual services	1,825,418	1,853,704	1,921,204
Services performed by other agencies	16,752	24,450	22,150
08 Supplies and materials	57,766	65,749	70,707
09 Equipment	17,494	27,700	24,200
13 Refunds, awards, and indemnities:			
Awards for employee suggestions	10		
15 Taxes and assessments	4,498	6,181	6,338
Total direct obligations	4,877,970	5,249,333	5,500,000
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	15,152		
02 Travel	2,417		
04 Communication services	30		
07 Other contractual services	5,235		
Services performed by other agencies	8,045		
08 Supplies and materials	120		
Total obligations payable out of reimbursements from other accounts	30,999		
Obligations incurred	4,908,969	5,249,333	5,500,000

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$1,864,213	$1,147,916	$900,249
Obligations incurred during the year	4,908,969	5,249,333	5,500,000
	6,773,182	6,397,249	6,400,249
Deduct:			
Reimbursable obligations	31,420		
Adjustment in obligations of prior years	20,993		
Unliquidated obligations, end of year	1,147,916	900,249	850,249
Obligated balance carried to certified claims account	52,543		
Total expenditures	5,520,310	5,497,000	5,550,000
Expenditures are distributed as follows:			
Out of current authorizations	4,180,486	4,700,000	4,950,000
Out of prior authorizations	1,339,824	797,000	600,000

Mr. HORAN. We have with us at this time Dr. H. C. Trelogan, the Assistant Administrator for Marketing Programs, Agricultural Research Administration.

We shall insert in the record at this point pages 1, 2, and 8 through 18 of the justifications.

(The material referred to follows:)

Agricultural Marketing Act

PURPOSE STATEMENT

Appropriations made pursuant to the Agricultural Marketing Act of 1946 (RMA—title II), provide for expansion of marketing research, service, and education activities in which the Department of Agriculture, the State agricultural experiment stations, the cooperative State agricultural extension services, the State departments of agriculture and bureaus of markets, and other public and private agencies are cooperating in solving problems relating to the distribution and marketing of agricultural products. Such funds are allotted directly to agencies of the Department for specified projects, or to State agencies on a matching-fund basis for carrying on projects under cooperative agreements, and are used under contract or cooperative agreement with public or private agencies, institutions, organizations, or individuals.

In accordance with title III of the Research and Marketing Act, the Secretary has established a national advisory committee of 11 members, 6 of whom represent producers or their organizations, to consult with the Secretary and other appropriate officials of the Department concerning research and service work authorized by the act, and to assist in obtaining the cooperation of producers, farm organizations, industry groups, and Federal and State agencies. This title also provides for the establishment, by the Secretary, of appropriate committees including representatives of producers, industry, Government, and science, to assist in effectuating specific research and service programs. Committees have been established under this authority to advise the Department on the principal agricultural commodities and in functional or cross-commodity areas such as cold storage, foreign trade policy, and transportation.

This appropriation is administered by the Agricultural Research Administrator.

Appropriated funds:	
Appropriated, 1953	$5,249,333
Budget estimate, 1954	5,500,000
Appropriation Act, 1953	5,250,000
Reduction pursuant to section 411	−667
Adjusted appropriation, 1953, and base for 1954	5,249,333
Budget estimate, 1954	5,500,000
Increase (for additional marketing research, service, and educational work to meet urgent current problems)	+250,667

Project statement

Project	1952	1953 (estimated)	Increases	1954 (estimated)
1. Marketing costs, margins, and efficiency	$786,280	$826,400	+$21,600	$848,000
2. Improvement and evaluation of product quality	1,151,196	1,230,300	+107,700	1,338,000
3. Improvements in market organization and facilities	1,733,360	1,842,933	+59,667	1,902,600
4. Collection, analysis, and dissemination of market data	1,043,082	1,155,300	+61,700	1,217,000
5. Overall administration	163,631	194,400		194,400
Unobligated balance	84,451			
Total available or estimate	4,962,000	5,249,333	+250,667	5,500,000
Reduction pursuant to sec. 411		+667		
Total appropriation or estimate	4,962,000	5,250,000		

STATUS OF PROGRAM

The Agricultural Marketing Act (RMA, title II) provides for research and marketing services in which the Department of Agriculture, the State agricultural experiment stations, the Cooperative Agricultural Extension Service, the State departments of agriculture and bureaus of markets, and other public and private agencies cooperate in solving agricultural marketing problems.

The act provides for continuous research to improve the marketing, handling, storage, processing, transportation, and distribution of agricultural products, and facilitates cooperation among Federal and State agencies, producers, industry

organizations and others in the development and effectuation of research and marketing programs to improve the distribution processes. It contains authorization to work on virtually all phases of marketing, using contractual, matching fund and cooperative arrangements with public and private agencies. Among the numerous projects conducted under the program, advantage is taken of each of these authorized arrangements to conduct relevant research, service, and educational activities.

The program is also designed to benefit all of the major agricultural commodity groups and as many of the minor commodities as possible, and to provide significant work at each stage of marketing, such as in assembly points, terminal or central markets, wholesale and retail markets. The essential objective of all the work is to increase the efficiency with which agricultural products are taken in the raw state from the farm and placed in the hands of consumers in the forms, at the times, and in the places desired by consumers.

As provided in the act, research and service contracts are used where the work can be carried out more effectively, more rapidly, or at less cost than if performed by the Department. Authority to contract with agencies outside of the Department for research and marketing services provides a means whereby the resources of private and other public research and marketing service organizations may be brought to bear on the agricultural problems which require additional knowledge for their solution. All contract work is supplemental to and coordinated with research and service work conducted by the Department. In the fiscal year 1952, 39 such contracts and 20 amendments were executed under the Agricultural Marketing Act totaling $637,590.

Further data on these contracts, including the project under which the contract was let, contractor, contract objective, and amount, are shown at the end of the statement which follows on selected examples of recent progress. There are also included the following tables:

Table I. Distribution of funds by major category.

Table II. Distribution of funds by agency.

Table III. Distribution of allotments to States by type of work.

Under a revised financial-project structure initiated in the current fiscal year the work is classified into the following broad fields:

1. *Marketing costs, margins, and efficiency.*—To provide information on costs and relative efficiency which will identify areas where more productive followup research work can be conducted, and to provide a basis for constructive educational and service work, studies are made of marketing and merchandising methods and transportation costs, and their effect on production and distribution patterns; alternative methods of performing marketing services; and factors influencing operating efficiency of the different units in the marketing system.

2. *Improvement and evaluation of product quality.*—To improve quality and acceptability of farm products and to lower marketing costs, studies are made of ways to reduce waste and spoilage, including better storage methods; and new and improved grades and standards are developed for more accurate indication of product quality.

3. *Improvements in market organization and facilities.*—To develop improvements in market operations, studies are made of structures, facilities, equipment, and methods to obtain more efficient use of labor through mechanization and work simplification; to conserve transportation by determining advantageous market locations or types of carriers; and to ascertain changes in market organization best suited to new products or types of distribution being introduced in agricultural commerce and trade.

4. *Collection, analysis, and dissemination of market data.*—To facilitate orderly marketing of farm products, data are gathered, interpreted, and disseminated on current and prospective production, supplies, movement of goods, prices, and market demand; and studies are made to improve the usefulness of market news and other market-information services.

5. *Overall administration.*—This activity provides for expenses related to overall administration, planning, and coordination of the Agricultural Marketing Act program, including any necessary expenses in connection with the work of the national advisory committee and other special committees made up of representatives of producers, industry, science, and Government. It covers all costs associated with administering, planning, and coordinating this program in the Office of Administrator, Agricultural Research Administration. To the extent that such overall responsibilities are assigned to other bureaus and agencies in connection with specific segments of the program, provision is also made under this activity for such costs. This activity does not cover the usual general administrative expenses necessary to the conduct of work projects, such as account-

ing, personnel, and purchasing work. These expenses are considered a part of the cost of conducting the work projects, and therefore the allotments for individual work projects include the appropriate share of such expenses.

Authorizations and appropriations for the Agricultural Marketing Act are as follows:

Fiscal year	Authorization	Appropriation	Fiscal year	Authorization	Appropriation
1947	$2,500,000		1951	$20,000,000	[1] $5,932,000
1948	5,000,000	$2,000,000	1952	[2]	4,962,000
1949	10,000,000	4,750,000	1953	[2]	[3] 5,249,333
1950	15,000,000	6,000,000	1954 estimated	[2]	5,500,000

[1] Excludes reduction of $68,000 pursuant to sec. 1214 of the General Appropriation Act, 1951.
[2] "In addition to the foregoing such additional funds * * * as the Congress may deem necessary."
[3] Excludes reduction of $667 pursuant to sec. 411 of the Department of Agriculture Appropriation Act, 1953.

Selected examples of recent progress

1. *Improved terminal marketing facilities pay off.*—Two new wholesale produce markets, located in San Antonio, Tex., and Columbia, S. C., are rapidly and steadily increasing their volume of business with no more labor than was employed in the old facilities. These are the most recent of terminal market facilities various communities have constructed as a result of studies and plans developed by the USDA, and designed to reduce labor and handling costs and to improve market quality and sales of produce. Reports from all facilities constructed so far show increased business and lower operating costs. New facilities—based on USDA plans—are either under construction or being planned at St. Louis, Mo., Hartford, Conn., Boston, Mass., Indianapolis, Ind., and Nashville, Tenn.

2. *Good drying and storage can prevent losses of corn.*—Farmers in the Southeast can save up to 42 million bushels a year by harvesting their corn early and shelling, drying, and storing it in tight bins. Corn-drying tests have shown that this procedure is practical under southeastern conditions and could prevent the estimated current 10 percent loss due to poor condition of the stored corn and subsequent insect infestation.

3. *Rapid methods for determining soybean oil content.*—Use of a rapid and simple test recently developed for determining oil content of soybeans will make it easier for growers to obtain full price benefit when selling high-oil-content soybeans. This method, which employs a high-speed grinder-extractor and an electronic tester, can be used during routine inspection. It does the job in 15 minutes, compared to several hours required by current methods; it is accurate and relatively low in cost. It has the added advantage of being suitable for use by nontechnical personnel.

4. *Foundation seed program increases feed supplies.*—Greater production of improved forage to feed the livestock needed to meet demands for meat and milk is being made possible by the large increase in certified seed supplies of improved varieties of grasses and legumes. For example, the 1952 supply of Kenland red clover was increased 10 times over 1951, and of Ranger alfalfa 3½ times. It is estimated that hay and pasture production from Kenland seed grown in 1951 alone is adding 300,000 tons of feed supplies.

5. *Cost studies show prepackaging at terminal markets is feasible.*—Cooperative studies with State experiment stations, showing that there is no material difference in cost of prepackaging potatoes at terminal markets in Oakland, Calif., and at shipping points in the Klamath Basin of Oregon and California, indicated that some packaging at terminal markets may be justified as a means of using labor at wholesale plants more fully. A full-scale test of the economics of such a practice would require revision of existing regulations affecting the movement of inspected and graded potatoes across State boundaries.

6. *Transportation costs are an important factor in location and operation of fertilizer plants.*—In cooperation with two fertilizer cooperatives, a study has been made of comparative freight rates, distance, and other factors involved in transportation of fertilizers. This information is of value to both private plants and cooperatives in determining the location of new manufacturing facilities to meet longtime fertilizer-production needs.

7. *Data obtained to help improve efficiency in carded-cotton yarn manufacturing.*—Wide variations in the efficiency with which labor is used in manufacturing carded-cotton yarn were demonstrated in a report on a contract study published by the USDA recently. The comparative cost data that are provided should assist

manufacturers in improving their operating efficiency. Many of these improvements can be made without too great a cost.

8. *Better protection from insects provided for stored grains.*—Insect damage to stored grain and grain products has been greatly reduced by treating cotton and burlap bags and fiberboard containers with a mixture of pyrethrins and piperonyl butoxide. Storage tests showed excellent control for 9 to 14 months. Tests have also demonstrated that insecticidal aerosols may be effective in controlling insects in flour mills and boxcars. Unexpectedly good results were obtained when aerosols were used in a quonset building containing 40,000 bushels of shelled corn.

9. *Maintaining quality of fruits and vegetables in retail markets.*—Proper refrigeration at night and sprinkling with tap water during the day are necessary to prevent waste from decay, wilting, and other deterioration of fruits and vegetables in retail displays. Demonstrations have shown that sprinkling several times a day and adequate refrigeration at night, preferably 40° F. or lower, are essential to the preservation of quality, appearance, and sales appeal of the produce.

10. *Automatic grain sampler developed.*—An automatic grain sampler designed for use in sampling flowing grain from spouts has been developed. The device was installed in a Chicago grain elevator for comparative testing with an automatic belt sampler and with standard methods used in sampling grain for inspection purposes. The new device holds promise of eliminating much time-consuming work and delays.

11. *Producers and distributors adopt improved marketing methods.*—In Wisconsin, where a number of dairy plants requested assistance under an Extension Service program in consolidating their operations, it is estimated that 1 group of creameries completing a consolidation program will save $28,000 per year in operating costs. Oklahoma farmers are gaining increased returns through a wheat marketing educational program conducted by county grain advisory committees established in 55 counties and numbering in their representation all segments of the grain trade. In Virginia, where livestock auction demonstrations have been conducted, buyers paid a premium of more than 5 cents per pound above comparable local prices for feeder calves. Seventy-two grading demonstrations conducted at three livestock markets introduced into Ohio a system of selling hogs on a basis more nearly reflecting the true quality and yield value of the animals. These are typical of the better marketing methods and new marketing facilities and equipment that producers and distributors have adopted as a result of this extension project.

12. *Control of insects in sacked dry beans improved.*—Sacked dry beans can be protected against insect infestation by adopting improved fumigation techniques developed in cooperation with warehouse operators. Tests showed that in fumigating beans under tarpaulins better stacking and more careful application of the fumigant greatly increased the effectiveness of the treatment. The addition of minute amounts of fumigant in liquid form to 1-pound packages of beans, as they are sacked on a packing machine, kills all weevil eggs and prevents infestation in the package while in retail channels.

13. *Use of egg-washing machines studied.*—A majority of plants using egg-washing machines are not obtaining optimum results in the washing and sanitizing of dirty eggs. This is because of failure to follow strictly manufacturers' instructions as indicated by a study of the mechanical performance of 9 different types of egg-washing machines in 31 commercial plants. The study further found that water alone or with a detergent will not do a satisfactory cleansing job; that some scraping or brushing action is necessary. The study recommended also that washed eggs be marked for early consumption and not placed in storage, reminding handlers that washed eggs—like dirty eggs—show greater quality decline in storage than do originally clean eggs.

14. *Service programs improve methods of marketing farm products.*—Work in many States has produced considerable improvement in proper identification of grade, particularly for perishable products. Establishment of the maximum-grade quality consistent with the raw materials harvested is in most situations to the advantage of both producer and dealer. For example, in Indiana and Illinois, marked improvement in grading, icing, and packaging sweet corn and in moving it quickly to consumers' markets has greatly increased volume of sales.

In Kansas, Illinois, Indiana, Tennessee, Arkansas, Kentucky, Virginia, Maine, and other States, concentration and grading centers for eggs have been established and wholesale buyers are informed of the availability of graded eggs. This has resulted in increased volume of sales and better prices. Some of these programs were coordinated with State labeling regulations.

15. *New methods measure fat and bone content of live meat animals.*—It is now possible to estimate the meatiness of cattle and swine without slaughtering the animals. Such estimates are used, especially in breeding and market stock, to relate carcass value to live market value. Roentgenographs of the cannon bone are used to determine the bone content of cattle. The antipyrene method of estimating body water is a reliable guide in giving precise estimation of the body components at different stages of growth and fattening. This method was used previously for cattle, and now has also been applied to swine.

16. *Tests show United States grades reflect feeding value of hay.*—Feeding tests with dairy cattle have confirmed the value of the United States grades as guides in buying and using hay. The scientific data produced by these tests established the relationship between grade and feeding value. For example, 1 ton of U. S. No. 3 grade of lespedeza hay is equal to 1¼ tons of U. S. Sample grade for feeding to milking cows, and U. S. No. 1 alfalfa is worth 12 to 14 percent more than U. S. No. 3 as a feed for growing dairy heifers.

17. *Color photograph manual helps meat-grading supervisors.*—As the result of research to improve standards of market classes of livestock and meat, a new manual has been issued which illustrates in color the differences in grades of lamb, veal, calf, and slaughter cattle. This will make more accurate grading possible. Colored film strips showing carcass grades and posters showing live grades also have been prepared.

18. *Mechanical handling of cotton in warehouses increases profits.*—The adoption of recommended methods of handling bales of cotton with portable lift trucks is reducing labor costs and increasing efficiency of operations. One large association estimates that the industry is saving around $5,000,000 annually through adoption of these methods.

19. *Tests aid small meat-processing frozen-food locker plants.*—Formulas have been developed that small locker plants can use to produce sausage items and meat loaves from meat byproducts that now are being sold to renderers at 1 or 2 cents a pound. Cost records are available for all operations from manufacture to distribution and sale, based on operation for 2 years of a test sausage-manufacturing plant. The record shows such plants can use labor more effectively, spread the overhead, save edible byproducts, and provide a wider variety of products for sale.

20. *Savings shown possible in tomato prepackaging.*—A survey showed that the tomato-prepackaging industry could save more than $2,000,000 a year by generally adopting certain methods and practices. For example, it was found that sorting tomatoes from one conveyer belt to another could be done more efficiently by sorting the tomatoes from one container into a number of other containers. The most efficient method of placing and filling trays is to partially fill the trays from bins along the conveyer belt.

21. *Farm storage of soybeans.*—Completion of studies of soybean storage showed that in nearly all postwar years it would have paid farmers well to store more soybeans at harvest time for sale later in the season. It is estimated that, as a result of the findings and their dissemination, increased farm storage of soybeans in 1951 brought farmers $30,000,000 net additional soybean income. In addition, farmers were able to cut down storage elevator costs and the demand on the already short freight-car supply was reduced.

22. *Self-service grocery-store methods and equipment improved.*—Research on methods and equipment for receiving, checking in, price marking, and other time-consuming operations in self-service grocery stores showed productivity can be increased from 67 to 86 percent. The most productive price-marking system includes stamping at the shelves prices on items from segregated commodity stacks in the storeroom. A self-inking price-marking set for use on stocking trucks and a new leaf-type sliding shelf, installed as part of each section of display shelves to support the case of merchandise during shelving operations, gave the highest production per man-hour.

23. *Vegetable prepackaging.*—Consumers want to see what they are getting for their money, new research on vegetable prepackaging reveals. Spinach packaged in unprinted film bags allowing a clear view of the contents outsold spinach packaged in film bags heavily printed with words and designs. The study also revealed that the defects most frequently found in prepackaged tomatoes were pressure bruises, scars, puffiness, and shriveled skin.

24. *Applemen adopt portable handling lift.*—Savings of roughly $100,000 should result from the use in 60 apple-packing and storage houses in the Pacific Northwest of a portable mechanical lift found in a Department study to be the most economical of several methods and devices tested for high-piling and breaking out high-piled boxes of apples.

25. *Technical assistance given to marketing agencies.*—Service work by States to help improve marketing efficiency has brought increased returns to farmers and produced higher quality commodities. In Wisconsin, a close check is made on milk and cream through pasteurizing, buttermaking, or cheese-manufacturing plants to determine the performance of processing equipment in terms of quality of the product. This leads to replacement of unsatisfactory equipment and appropriate changes in methods of processing that result in products of higher quality and greater returns. In North Carolina, Virginia, and Maryland, where high moisture content of grain at harvest and improper handling and storage brought large losses to producers, assistance has been given in establishing new and modern storage and the use of drying equipment. As a result, the price of corn in one State increased 40 cents a bushel.

26. *Retailer-training program saves food and increases sales.*—More than 2,900 training classes, involving nearly 26,000 retailers and their employees, have been conducted under contract by the United Fresh Fruit and Vegetable Association since the beginning of the training program in 1947. The program was set up by the Department to stimulate movement of fresh fruits and vegetables, to reduce losses from spoilage, and to preserve eating quality. Surveys of retailers taking the course show widespread and substantial increases in volume of sales. It is estimated that savings from reduced spoilage alone amounts to approximately $5 million a year.

27. *Improved cattle-on-feed reports indicate meat-supply trends more accurately.*—As a result of research on sampling and extension methods, more accurate and comprehensive information on forthcoming meat supplies and probable future trends can now be obtained. Information is given in quarterly reports issued in three selected test States—Iowa, Nebraska, and Illinois—of the number and kinds of cattle on feed, length of time on feed, weights, expected marketings, and feeding rates. These reports have been widely used and commended by livestock producers and the livestock trade, and requests have been received to extend the coverage of these new-type reports to other important feeding areas.

28. *Data on foreign markets and competition aid United States farmers.*—Information that will help maintain foreign outlets for United States farm commodities is being obtained through systematic studies of shortages of exchange, discrimination by governments, bilateral trade and barter agreements, competition by other producing areas, and other factors that affect foreign demand. This information is vital to United States farmers, since two-fifths of their cotton, one-third of their wheat, and one-fifth of their tobacco find their way to foreign markets. The rapidly expanding citrus industry and the livestock industry are also benefiting directly from the data being gathered.

29. *Consumer education aids food marketing.*—Marketing information is now made available under Extension Service programs in 15 States and Puerto Rico to help food shoppers buy most effectively and teach them proper care and efficient use of food in the home. This information, provided mainly through demonstrations and exhibits, reaches millions of people. Thousands of requests for additional information are evidence that many people rely on this program to guide them to wise food purchases.

30. *Assistance given in marketing of farm forestry products in Georgia.*—To assist Georgia landowners in marketing their farm forestry products in a complex marketing situation with no standardized specifications and a pronounced lack of uniformity in prices paid for logs and rough forest products, a list of buyers in each county was prepared. The list, resulting from investigations by the Georgia Agricultural Experiment Station and the Forest Service, provides information on the products and species purchased, together with specifications the buyers use. The Georgia Crop Reporting Service provides current information on price changes.

TABLE I.—*Distribution of funds by major category, fiscal year 1952 actual and fiscal years 1953 and 1954 estimated*

Item	Actual 1952	Estimated 1953	Budget estimate, 1954
Allotments to States, on a matching-fund basis, for marketing research, service and educational work	$1,165,452	$1,229,800	$1,295,000
Research and service contracts	637,590	600,000	600,000
Projects carried out directly by Department of Agriculture agencies	3,074,928	3,419,533	3,605,000
Total	4,877,970	5,249,333	5,500,000

TABLE II.—*Distribution of funds by agency showing actual obligations for the fiscal year 1952 and estimated for fiscal years 1953 and 1954*

Agency	Direct work (other than contracts)			Contracts			Total		
	1952, actual	1953, estimated	1954, estimated	1952, actual	1953, estimated	1954, estimated	1952, actual	1953, estimated	1954, estimated
Bureau of Agricultural Economics	$775,929	$867,633	$910,500	$195,315	$230,000	$230,000	$971,244	$1,097,633	$1,140,500
Agricultural Research Administration:									
Office of the Administrator	120,193	150,800	150,800				120,193	150,800	150,800
Office of Experiment Stations	252,777	267,000	279,800				252,777	267,000	279,800
Bureau of Human Nutrition and Home Economics	8,700	6,500	7,000				8,700	6,500	7,000
Bureau of Animal Industry	19,063	19,600	29,000	18,000			37,063	19,600	29,000
Bureau of Dairy Industry	18,395	19,000	29,000				18,395	19,000	29,000
Bureau of Plant Industry, Soils, and Agricultural Engineering	295,229	334,500	346,000	10,000			305,229	334,500	346,000
Bureau of Entomology and Plant Quarantine	81,302	101,000	112,000				81,302	101,000	112,000
Forest Service	23,475	30,000	32,000				23,475	30,000	32,000
Production and Marketing Administration	1,828,989	1,966,000	2,061,500	292,150	274,000	274,000	2,121,139	2,240,000	2,335,500
Farm Credit Administration	171,638	187,500	198,000	24,125	21,000	21,000	195,763	208,500	219,000
Extension Service	482,965	527,200	560,000	98,000	75,000	75,000	580,965	602,200	635,000
Office of Foreign Agricultural Relations	127,075	137,400	147,000				127,075	137,400	147,000
Office of the Secretary	4,371	4,400	4,400				4,371	4,400	4,400
Office of the Solicitor	4,932	5,000	5,000				4,932	5,000	5,000
Office of Information	25,347	25,800	28,000				25,347	25,800	28,000
Total	4,240,380	4,649,333	4,900,000	637,590	600,000	600,000	4,877,970	5,249,333	5,500,000

TABLE III.—*Distribution of allotments to States by type of work, fiscal year 1952 actual and fiscal years 1953 and 1954 estimated*

Type of work	Actual, 1952	Estimated, 1953	Budget estimate, 1954
Cooperative projects with State extension services	$403,002	$431,600	$454,000
Cooperative projects with State departments of agriculture and bureaus of markets	520,850	543,000	573,000
Cooperative projects with State agricultural experiment stations	241,600	255,200	268,000
Total allotments to States	1,165,452	1,229,800	1,295,000

Mr. HORAN. Dr. Trelogan, we would like to have a general statement from you at this time.

Dr. TRELOGAN. Very well, sir.

GENERAL STATEMENT

The challenge of feeding of 190 million people by 1975 looms ahead as one of the major problems of agriculture, which has received considerable recognition in the last couple of years. It has readily suggested the need for getting additional production from the available cropland. It also suggests, upon reflection, a number of marketing problems which we should foresee.

Feeding these people will require exhaustive and efficient use of the volume and the kind of farm products delivered to the markets by the farmers. Getting more complete use of our agricultural products in direct human consumption is going to be a marketing problem. It will involve the elimination of waste and spoilage of perishable commodities; it will involve the more effective and efficient processing and merchandising of byproducts, products that are not fully utilized now; and it will also involve the development of marketing improvements to accompany the farm production improvements that we may anticipate.

We may expect that the trend toward larger, more specialized farms is likely to continue in the drive to get greater output. Along with that, the trend toward greater mechanization of our production and harvesting functions is likely to continue in the drive to get lower farm production costs. These will necessitate marketing adjustments of considerable magnitude.

NEED FOR MARKETING ADJUSTMENTS

We can draw upon recent experience to indicate some of the types of changes we have a right to anticipate.

Mechanically harvested cotton, for example, is requiring a considerable adjustment in the ginning process to avoid undue loss of grade. There is more trash. More foreign material has to be removed without damage to the lint, when you go into the mechanical harvesting.

In a similar way, mechanically harvested potatoes require a considerable adjustment in the conveyor and bin storage systems, to avoid the damage and loss in the handling of potatoes.

You will recognize that mechanically harvested potatoes are not allowed to lie in the fields so that the skins can harden and dry before they are subjected to handling in the packinghouses and storehouses.

In a similar way, combine wheat and mechanically harvested rice depend more upon the marketing channels to condition and dry the grain.

Mr. HORAN. I think it is well for us to call to mind the work which the Department has done with regard to the handling of potatoes. One of the really fine things which I think we have learned was the condition and the temperatures at which potatoes should be held if we are to get a good product on the consumer's table in the shape of saratoga chips or french fries. The condition and handling almost spells it out for them.

Dr. TRELOGAN. Yes, sir.

Mr. HORAN. We have not done too good a job in getting that information cut to the restaurant people, in my opinion. I do not know how we can correct it.

Along the line you are discussing now, it is almost vital to the emphasis that we would like to have placed on the use of these funds to increase the demand.

Dr. TRELOGAN. That is right.

Mr. HORAN. The condition that contributes to a good potato chip or a good french fry is immensely important.

Dr. TRELOGAN. Yes, sir.

Mr. HORAN. I hope that we may give a little more emphasis to this. This will also be discussed when Dr. Stiebeling and others come before us.

Dr. TRELOGAN. I just want to suggest that all of these changes which I have described and which we may expect in the future are going to require the design, installation, and operation of new marketing equipment and facilities, as well as the adoption of new methods. It will be necessary to train operators for these new facilities and new handling methods which may be forthcoming.

NEWER VARIETIES OF PRODUCTS

We have reason to expect that the plant breeders will develop and the farmers will adopt new and improved and higher yielding varieties. These will need to be shipped at the proper time, handled with the proper care, stored under the proper conditions, and distributed in proper quantities and containers to preserve the gains from genetic improvements and cultural practices and harvesting methods adopted by farmers. The larger, more productive and more attractive products which the plant breeders develop and farmers are able to produce through increased fertilization and other improved cultural practices are more susceptible or more vulnerable to damage in the market place. The packing, holding, and shipping schedules and techniques have to be revised if the consumers are to realize the benefits of these new products which are more subject to damage from disease infestation, rough handling, and improper trimming and displaying in the marketing channels.

NEW MARKETING METHODS

Entirely new methods and industries are being introduced and are likely to be introduced to enable consumers to enjoy farm-fresh produce and thereby to increase the demand and consumption of our products. The frozen food industry is a very good example of a new

industry that entails drastic changes all along the line of our marketing system. We can recognize how it changes the processing, transporting, warehousing, and retailing techniques.

At the processing end there are the blanching and the freezing techniques. At the other end we can see rather readily the changes in the retail store, where different types of display cases and methods are introduced.

Intervening between these points, and just as important, are the changes in the transportation system, where there has to be developed lower temperature equipment for both railroads and trucks.

Mr. HORAN. In my own industry, you cannot sell a pear to a broker unless it is green. After that you cannot sell it to the housewife unless it is yellow.

Dr. TRELOGAN. That is correct, sir.

With the frozen foods the warehousing system has to be altered, not only to provide the lower temperatures that are required, but also to provide arrangements for sorting and filling the orders for distribution to retail stores. The products have to be handled and delivered without being subjected to the higher temperatures which would cause deterioration in these foods. Research is needed to implement these changes and to avoid loss from investments in equipment that may soon become obsolete, and also from impractical methods and misleading instructions that are apt to be adopted with respect to how to handle the products not only in the market but also in the household.

PROBLEMS IN MARKETING NEW COMMODITIES

If we can draw from recent experience with new products, such as hybrid corn, we will find they are likely to have a different composition than the older varieties they replace. This suggests that we will need extensive analyses of the constituent elements of these new products in order to establish their market values. The buyers will need to know what are the nutritive values of these new products, so that they can judge correctly in terms of the amounts needed to feed animals or to provide the nutritive requirements for their families for whom they are buying.

There will be some closely related problems of establishing new types of market news and statistical services for the benefit of the trade with respect to the production, stocks, movements and disappearance of these commodities.

Let me give one illustration. Recently we have seen a rapid rise in use of broiler-type turkeys. Now, that requires some alteration in our estimates of hatchings and stocks and movements of turkeys so that the people who are judging supply and demand on the basis of the statistics will be able to differentiate between the data that apply to the newer type of turkeys and the older type of turkeys. This is a problem currently confronting industry, which needs to know how to interpret the available statistics, because they cannot be construed to be comparable with the statistical series provided heretofore.

You doubtless recognize, too, that with the new products likely to be forthcoming there will be a need for different grades and standards—different from those we have had in the past—to help establish market values and to facilitate trading.

ADEQUATE STOCKS FOR INCREASED POPULATION

A corollary problem accompanying the growth of population is one of establishing new benchmarks with respect to what are adequate stocks and carry-overs required from year to year and season to season in the light of the increased demands and the increased supplies with which we will be dealing. Such benchmarks are needed to provide for orderly marketing, by helping those who have to judge the situations that will arise as we encounter recurrent periods of surpluses or shortages resulting from fluctuations in weather and business conditions.

We have pretty good reason to believe that with a larger population stocks will be carried at higher levels. This leads to a need for increased vigilance in protecting these stocks from rodent damage, insect infestation, from disease and other types of deterioration. At the same time the drive for conservation is going to accentuate the need for research on these problems.

A particularly grievous problem that is already calling for more attention is one of preventing insect contamination in processed products. Mechanical harvesting of products that move directly into a mass processing system permits less opportunity for detecting, and more opportunity for inadvertently incurring insect contamination in the end products. With the drive of the Food and Drug Administration and industry groups who are currently trying to avoid such contamination, we have urgent requests to study this problem, which we anticipate will grow in the future.

Mr. HORAN. The newspapers yesterday noted that 18 million tons of foodstuffs had been captured by the Food and Drug Administration.

Dr. TRELOGAN. Yes, sir.

Mr. HORAN. I assume that a great deal of that was due to the causes you have just enumerated.

Dr. TRELOGAN. That is my assumption, too, sir. The Food and Drug Administration has forewarned the grain trade, for example, that they are going to be more diligent after July in seeking the reduction or elimination of the insect infestation. The grain trade is urgently asking for help right now, to cope with that situation.

CONSUMER EDUCATION

Along with the research I have been suggesting, we will need increased services, such as consumer education and education of handlers of these new products. The problems you suggested with respect to potatoes earlier in our discussion, apply to a number of other commodities. Consumer education should help the consumers to judge and buy these products economically and to prepare them properly. It will help to get consumers to accept the new products which will be produced by farmers and which are likely to be processed by industry.

We will need additional technical service activities to help induce processors to prepare byproducts in the forms, in packages and at prices that will be satisfactory to consumers. This suggests that along with research we need to expand educational work of the Extension Services and the technical assistance work of the State departments of agriculture.

30505—53—pt. 2——6

LONG-RANGE PROBLEMS

Up to this point I have been speaking about some of the longer range problems which are ahead of us. As I conclude that, I present this general proposition: If reduced costs of farm production are achieved they will probably need to be accompanied by reduced costs of marketing if producers and consumers are to get the benefits of the advances and progress made by farmers. This must be accomplished in the face of higher labor, transportation and marketing service costs.

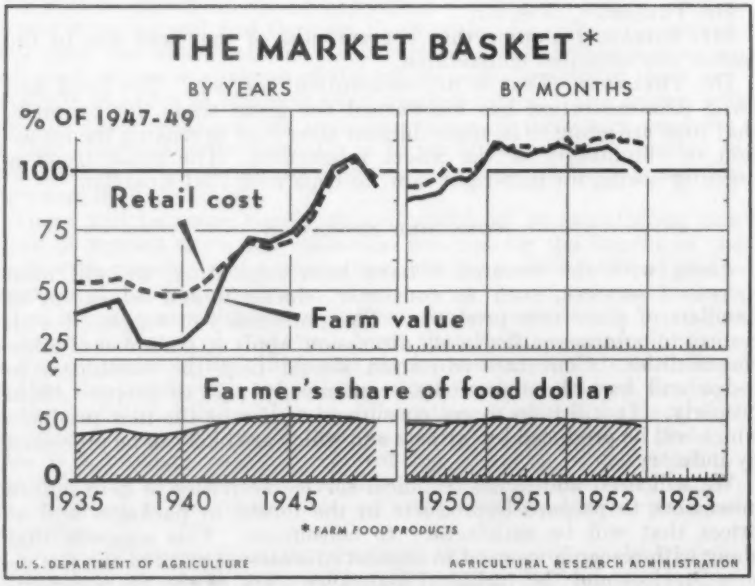
Discussion of the long-range outlook for expanding demand for agriculture products should not divert our attention from problems of immediate urgency, of the type which we are now encountering, such as the decline of farm prices, the accumulations of stocks, and rising costs. A long-term upward trend in demand will not eliminate recurrent fluctuations in business conditions and weather, that profoundly affect the relative positions of farm prices and retail prices.

I understand you have given some attention to these relationships in discussing testimony already presented by Mr. Wells, of the Bureau of Agricultural Economics. Today, I will refer to just two charts to sum up the situation confronting us.

FARM PRICES

The first chart simply shows how farm prices have been declining, while retail prices have been remaining relatively stable.

(The chart referred to is as follows:)



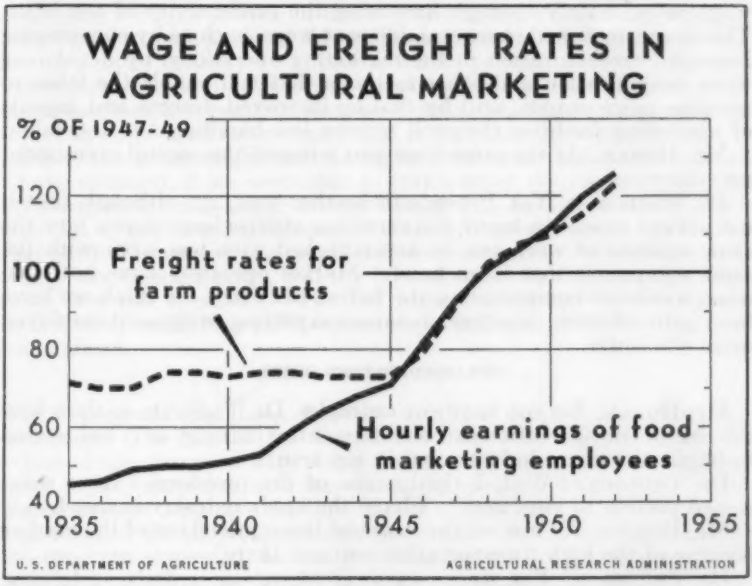
Data from the Bureau of Agricultural Economics.

Dr. TRELOGAN. As a consequence, the farmer's share of the consumer's dollar has been declining. Part of this change can be ascribed to abundant crops in 1952, and part of it to the characteristic relative stability of the retail prices compared with farm prices. But of more importance to us in the research and service program that we are dealing with is what is happening to market costs and to foreign market demand, as factors contributing to the changes.

WAGE AND FREIGHT RATES IN AGRICULTURAL MARKETING

The second chart is designed to point to two major cost elements and indicate what has occurred to them in recent years.

(The chart referred to is as follows:)



Data from the Bureau of Agricultural Economics.

Dr. TRELOGAN. When we examine what has happened to transportation rates and hourly earnings of food-marketing employees, it helps to explain the reasons why marketing margins have a tendency to widen at this time. Our research program has been concerned with these two problems.

FREIGHT RATES

We have devoted considerable effort to accumulating evidence and presenting it to the appropriate regulatory bodies to help hold down the increases in freight rates. We think that we have had some influence, perhaps, in delaying some of the increases and having increases granted that were somewhat less than the requests. It is perfectly obvious that we have not been highly successful, when you see the types of changes that have occurred.

The succession of 12 railroad freight rate increases that have been granted by the ICC since 1946 has induced us to put greater emphasis on other types of transportation research. This research is intended to help the shippers adjust to alternative methods which may be open to them for getting their products to the market or through the marketing channels. It is intended to eliminate as much of the weight and volume of products as is possible before they are moved from the assembly points through to the consumers. It is also designed to reduce the amount of crosshauling and backhauling that may be employed in the marketing of farm products.

WAGE RATES

In a comparable way, we are trying to reduce the impact of rising wage rates, mainly through increasing the productivity of the labor. This is accomplished in several different ways, such as by encouraging increased mechanization in the marketing operations, by developing work simplification and other methods that will enable the labor to produce more output, and by finding improved designs and layouts of marketing facilities that will require less handling and less labor.

Mr. HORAN. At the same time you increase the capital investment necessary.

Dr. TRELOGAN. Yes, it tends to be that way, sir, although that is not always true. In many instances our studies have shown how the same amount of work can be accomplished with less labor with the same equipment that is on hand. Market operators have not been using available equipment to the fullest efficiency. I think we have been quite effective in several instances in getting equipment employed more efficiently.

TRANSPORTATION COSTS

Mr. HORAN. Do you have any examples, Dr. Trelogan, to show how the cost of transportation can blight an entire industry as it has tended to blight our wheat industry out in my area?

Dr. TRELOGAN. Well, I think some of the problems I have mentioned pertain to your area. I have the apple industry in mind.

Mr. HORAN. We are on the verge of being priced out of the market because of the high transportation cost out there.

Dr. TRELOGAN. Yes, sir.

Mr. HORAN. We are not yet out of the market.

Dr. TRELOGAN. But you are in a precarious competitive position as a result of rising transportation costs.

Mr. HORAN. It is a very precarious position. Of course, the freight rates have excluded any Pacific Northwest wheat from Eastern markets, with the exception of certain blending wheats.

Dr. TRELOGAN. Yes.

Mr. HORAN. Of course, ours is a soft wheat. There is competition from Canada, with lower production costs, and there are the idiosyncrasies in the loan pattern of the PMA, which have turned the California market over to southern Idaho.

Therefore, the wheat industry in my area is a good example of how freight rates can blight an entire area. If it were not for the Commodity Credit Corporation and the support prices for wheat, our wheat growers would be in bad shape. Our milling industry is.

Dr. TRELOGAN. Yes.

Mr. HORAN. We are trying to correct it. I do not know how we are going to do it. Maybe you have some ideas.

Dr. TRELOGAN. We are working on them. That is what I am trying to say. We have some ideas, and we are trying to develop them to the extent that we can.

Mr. HORAN. We can use them.

INCREASED DEMAND FOR SERVICES

Dr. TRELOGAN. Efforts to reduce these marketing margins encounter an increased demand for marketing services. Just as the farmers are seeking more services to facilitate and to enable them to adopt mechanized harvesting as a means of saving labor and reducing cost, the consumers want and are evidently willing to pay for more marketing services to relieve them of household work. I cite just a few examples, such as sliced cheese, prepackaged meat, and eviscerated cut-up poultry, which may appear in a neat package of frozen chicken. These innovations illustrate the trend. Such new services are additional services representing increased costs, which are cumulative on top of the increased rates of pay and rates of transportation.

Now, the point might well be made that under the circumstances I have outlined, if we were able to just temper the increases or hold the margins for marketing from widening still further it would probably be a real accomplishment. There is good reason to believe that the full impact of the recent increases in wages, under the pattern set by the steel industry, and the last increases in the transportation rates, has not been felt. The full impact of those changes on our agricultural marketing still promise some difficult problems of adjustment ahead.

APPROACH TO PROBLEMS

Our program has been heavily weighted toward the short-run problems. The reason for this is that we were concerned at the outset of this program with rising prices, widening margins, declining farm prices, surpluses and impending surpluses. Consequently, we placed greater emphasis on these types of problems as we undertook and initiated the projects under the program. It was our hope that, as the program expanded, as was provided by the authorizations in the original legislation, we would have an opportunity in due course to take on basic research and treat the longer range problems which we could foresee.

At the outset we also made a conscientious effort to get started in at least a limited way on all the different types of activities that were set forth in the legislation. In only a few instances did we omit or delay a start on items in the list of things that were laid out there for us to work on. In these cases, too, we figured that as the program expanded we would have opportunity to initiate work that could be delayed at the outset, in view of the more urgent and pressing immediate problems.

MOBILIZATION AND ITS EFFECT ON THE PROGRAM

Moblilization came upon us rather unexpectedly, and before our hopes and plans had materialized. The mobilization program affected us in two ways. First, it led to a substantial decrease in our program.

This was met primarily by curtailing the type of work that was designed to try to relieve surpluses.

Second, it brought a new set of short-term immediate problems that needed to be dealt with. Consequently, we tried to divert the emphasis in our research and service programs toward the new problems. We tried to hold as many of the activities as possible on the stand-by basis. We tried to find convenient stopping points for a number of our line projects, in order to avoid the loss of investment that had been made in the starts that were undertaken. We shifted the personnel and the projects to emphasize such things as labor productivity and quality maintenance in the interest of trying to deal with problems of shortages that accompanied mobilization.

Fortunately, a great share of our work was so conceived that it contributed to problems of shortages as well as surpluses. The cost and margin work, the consumer education work and the technical assistance work all contributed to either type of problem, and we were able to make appropriate adjustments quickly. Fortunately, too, a great share of our work on short-range problems was not inconsistent with what we would want to do ultimately on long-range problems. The work on quality maintenance, for example, having to do with reduction of waste and spoilage contributed to the short-range needs for conservation as well as the long-range needs.

Right now we are returning to the problems which confronted us at the start. We are trying, again, to redirect the emphasis, to deal with the problem of surpluses and impending surpluses.

USES TO BE MADE OF INCREASED FUNDS

Our request for funds today is intended to provide for a small degree of restoration of that work which was curtailed as mobilization came upon us. We hope to put some of our projects on a more efficient scale of operations than has been the case in the last couple of years, when they have been held on a restricted basis, and we look forward to the initiation of two new projects that deal with current problems.

The first of these projects is designed to work out a system of market identification of meat-type hog breeding stock. The objective is to facilitate the more rapid adoption and production of the meat-type swine by farmers, as a means of helping to alleviate the surplus of lard that is upon us and that we expect will be with us for some time.

The second of these projects is designed to provide a simple, reliable test to identify the baking type as distinguished from the dairy type of nonfat milk solids. The objective here is to encourage greater use of these products. One of the fundamental obstacles in the way of this objective is that the buyers of nonfat dry milk solids need greater assurance, when they are buying, that they are buying the right type of powder for the purpose they have in mind. Nothing can be more disastrous for a baker than to obtain the wrong kind of milk powder when he needs the kind of powder suitable for baking. Ne needs this test in his buying, so that he will avoid having to go to the expense of running experimental baking tests to see whether each lot of powder will be suitable or not.

The detail with respect to what we would propose to do in the next year with the funds requested is indicated by projects in the book of projects distributed to the committee.

In closing, let me express the thought that the current dynamic situation offers some real opportunities for increasing the labor productivity and for accomplishing other efficiencies in our agricultural marketing system.

As we look at the long-term prospects for a growing population and a larger volume of production, we can see opportunities for achieving further economies of scale if the industries and the business firms can plan for them properly when they are building new structures or installing new equipment.

CURRENT DEVELOPMENTS AFFECTING MARKETING

The shorter run prospects, suggest some rapid shifts in location of producing and consuming areas, which are likely to augment the need for relocating and renovating many marketing facilities. Evidence of shifts that are obvious to us are the new urban shopping centers that are being built throughout the country. In nearby communities we can see entirely new buying centers being established, such as those centered about big suburban department-store developments. Around other cities, too, they represent new channels, and new ways of distributing our agricultural commodities along with the other products.

These may prove to be powerful influences toward the relocation or revision of our wholesaling and terminal-market system.

The influence of big, new arterial highways which are being established will be in the same direction. With the increase in the use of trucks and the rerouting of these highways, it tends to increase the pressures for relocating some of our markets.

IMPROVED MARKET FACILITIES

With these developments and the opportunities they provide for adjustment, we really need some research before investments are made in new facilities and new marketing arrangements.

I think most of the members of this committee are aware of the persistence with which obsolete facilities and outmoded practices continue to be employed in agricultural marketing. When you look at some of the old markets, such as Dock Street in Philadelphia, the Faneuil Hall market in Boston and the Washington Street market in New York you find ample evidence. It pays to get some scientific guidance and planning before such markets are established, because folks have to live with them for a very long time afterward.

I am confident that the program we are discussing has been doing good work. Illustrations of more recent accomplishments are shown in the notes. I am also confident that we have the experienced personnel and the know-how to go forward and make greater contributions toward the solution of the problems which are ahead as well as those that are with us now.

This can be done on whatever scale of operations is deemed most appropriate.

WORK WITH RETAIL ORGANIZATIONS

Mr. HORAN. One of our leading stores—which, incidentally, started out in our area, at American Falls, Idaho—has quite a campaign on this week, I noticed. That is the Safeway Corp., which ranks along with Krogers and the A. & P. as our largest retail-outlet organizations. Do they rely upon you folks a great deal for advice and assistance?

Dr. TRELOGAN. The larger chainstores have been affording us opportunities to do research work with them, and they have shown a tendency to adopt some of the methods that have been developed, but I believe in general it is the smaller independent group that relies on us more heavily than the larger organizations.

Mr. HORAN. I would assume that would be true. I think that is a very wholesome situation.

MARKETING WORK ON DAIRY PRODUCTS

Mr. MARSHALL. Dr. Trelogan has mentioned one thing in connection with the dairy program, and I would not presume that we should take any more time here, but so far as I am concerned if he could supply this for the record, Mr. Chairman, I think we could save a little time. I would like to have him supply for the record the answers to three questions. Then it will not be necessary to go into it tomorrow.

Mr. HORAN. Well, we will want to go into some of these items quite fully, especially the terminal-facility program, which we have not gotten too far along with.

I notice you have made some headway in South Carolina and Texas.

Dr. TRELOGAN. Yes, there have been markets opened at San Antonio, Tex., and Columbia, S. C., and Hartford, Conn., and St. Louis, Mo., within the last year or two.

Mr. HORAN. Do you have any illustrations of that work with you?

Dr. TRELOGAN. Yes, that is in our notes.

Mr. HORAN. You do not have any pictures, though?

Dr. TRELOGAN. No, I do not have any pictures with me, but I can bring them.

Mr. HORAN. Could you bring them tomorrow?

Dr. TRELOGAN. Yes.

Mr. MARSHALL. In addition to what you were talking about and the work you were doing with the bakers on the dry milk solids, I should like to know what you are doing to help in the marketing of more dairy products.

Also, do you have any plans for additional research along that line?

Dr. TRELOGAN. Let me just answer you in this way, Mr. Marshall: The projects that are specifically dairy projects are listed in the project book distributed to you. They are marked "Dairy" in the index appearing in the front of the book. You can spot them that way. You recognize, of course, that there are a number of projects that cut across commodity bounds. They benefit dairy as well as other farm products. These appear in the index as "General" projects.

In addition, I have with me a copy of the progress report prepared for the last Dairy Advisory Committee meeting. I wonder if that

would satisfy your request. It presents the work being done and recommendations for future work.

Mr. MARSHALL. Possibly it would.

Dr. TRELOGAN. Let me show you what I have in mind. This [indicating] is the progress report on dairy research made to the Dairy Advisory Committee last month, and on page 54 the discussion of marketing work starts. You will see outlined the progress that is being made on marketing research; and marketing-service work is presented in the latter part of the book.

Would that be helpful to you, sir?

Mr. MARSHALL. I think I will glance over this, and then tomorrow we may go into it further.

Dr. TRELOGAN. Very good.

Mr. MARSHALL. That is all I have.

Mr. HORAN. Thank you, Dr. Trelogan. The committee will stand adjourned until tomorrow morning.

WEDNESDAY, MARCH 4, 1953.

Mr. ANDERSEN. The committee will come to order, gentlemen.

MARKETING COSTS, MARGINS, AND EFFICIENCY

Doctor, I notice that you have four increases amounting to a total of approximately $250,000. No. 1 has to do with an additional $21,600 for marketing costs, margins, and efficiency. The general purposes, as I recall, of that particular program are to determine how to reduce labor and transportation costs between the farmer and consumer, are they not?

Dr. TRELOGAN. Those are the four financial projects we have under the act and the first one there has to do primarily with the measurement of the costs and margins and with follow-up efficiency studies in which we are trying to find out how alternate methods may be developed to reduce the cost and margins incurred.

Mr. ANDERSEN. Will you give the committee some idea as to how your work in the past has helped in this regard. Perhaps you can give us specific examples of results obtained.

Dr. TRELOGAN. Yes. First we have two approaches to the measurement of the costs and margins. One approach is to make a detailed study of all the costs that are incurred between the time products are delivered to the market by farmers and the ultimate consumer receives them. A detailed study of this nature has usefulness from the standpoint of understanding and comprehending all of the services that are performed on products in the marketing system and the costs that are incurred for each of these services. It is very useful from the standpoint of the extension programs and the educational programs designed to get a wider comprehension of what is involved in marketing. But more important to us, it gives us productive leads on where we can go with followup research that will be fruitful in actually reducing the costs and the margins. An example of that is taken from Washington apples. When we make these studies we find almost invariably that the retail margin is the widest margin that is experienced.

SPOILAGE INCREASES RETAIL MARGIN

This was true in the case of apples. We traced apples from Washington State from the time they were delivered to the packinghouses until they reached consumers in Chicago and found that retail stores were taking the widest margins. Analysis of what contributed to that wide margin, which included the costs in retail stores, revealed somewhat to our amazement that the waste and spoilage and loss of apples in retail stores was a high element of cost.

Upon looking into the problem further, we found that it was not the retailer who was responsible for the losses. The losses were resulting from bruising and damage that occurred before the retailer got the apples. The retailer happened to be the man who was holding them when they became unsalable.

Following that lead, we went back into the packinghouses and examined the transportation facilities and equipment to find out where the bruising was occurring. Having determined that, research men started to work on how to adjust the conveying systems and the other packinghouse equipment as well as the packaging materials and methods. These cost studies gave real impetus to the same sort of study on transportation. The results forthcoming have reduced those losses considerably since the work began.

MARKETING COST STUDIES

The second approach to costs and margins measurement is to make comparative studies among firms or organizations or parts of the market that are performing similar functions. These cost studies indicate the cost experiences of these firms according to specific functions that are performed. That is, the detailed functions are analyzed on a comparable basis. That gives us representative averages on the costs experienced by all the firms but more important it gives us the range of cost experiences between firms. When we publish these data and indicate the factors that lead to either high or low cost for each of these functions, it enables business managers to first find out where they stand in relative efficiency compared with their competitors, and it gives them useful clues as to how they might improve the efficiency of their operations. The different segments are analyzed separately so that each can be examined for opportunities to reduce their costs. Through competition we would anticipate that the margins would be diminished.

IMPROVEMENT AND EVALUATION OF PRODUCT QUALITY

Mr. ANDERSEN. All right. For project No. 2, the improvement and evaluation of product quality, you are asking an additional $107,000 above the $1,230,000 which we gave you for this fiscal year. Describe for us the work now being done in this particular line, the new work proposed and what effect the results you have obtained have had on the cost of distribution.

Dr. TRELOGAN. The work being done in this project is directed to two main objectives. One is to protect and maintain the quality of the products as they are delivered to the market by farmers until they reach the ultimate consumer. Our thought has been that since the

losses from waste and spoilage are as great as indicated by the studies we have made, the deterioration in quality of produce that remains salable is probably a still greater loss. So our objective here has been to try to develop ways and means of retaining the quality of produce as it travels through the marketing channels so that consumers will get the benefit of the farm-fresh produce to the fullest extent possible. We recognize here, by the way, that in some of our commodities improvement of quality is obtained through processing, aging, or curing but for the most part in the case of perishables the produce has its highest quality at the time it is produced on the farm. Take the egg, for example. We feel it is at the highest quality at the time it is laid and the job of marketing is largely one of protecting that quality to the fullest extent possible until it reaches the consumer. Retention of quality should lead to more satisfied customers and thereby increase consumption; better provision of nutritive and dietary requirements of family consumers; and cut down costs by reducing the amount of deterioration that takes place.

The next objective for this project is to develop tests that will accurately and reliably identify quality in such a way that market values can be more readily established and trading will be facilitated. This may involve the improvement of standards and grades to facilitate grading services used for marketing purposes. A larger share of the work is concerned with efforts to get more simplified tests that can be used by inspectors and graders on a field basis. We seek tests that are more comprehensive and more to the point with respect to identifying and evaluating the quality factors sought by buyers of these products. In a number of instances we have been able to contribute worthwhile improvements. I shall mention just 1 or 2.

TESTS ON QUALITY IDENTIFICATION OF WHEAT

In the case of wheat, the main objective of the principal buyers is to ascertain its bread-baking qualities. Heretofore, buyers have had to resort to an extensive baking test to be assured of bread-baking qualities. We are trying to find quick tests that will indicate the bread-baking qualities of different varieties of wheat. This involves a qualitative as well as a quantitative analysis of bread-baking constituents. One such method is the sedimentation test which is now in the process of being perfected. It is hoped that this test or some other method can be developed of evaluating the wheat in terms of its bread-baking qualities without the necessity of going through the laborious task of actually baking bread to find out. An acceptable quick test should use a much smaller sample than is required to bake a loaf of bread. In a similar way in the area of cotton.

GRADES AND STANDARDS OF COTTON

Mr. ANDERSEN. Describe the projects dealing with the grades and standards affecting the values of cotton. What evidence do you have of beneficial results of such work?

Dr. TRELOGAN. I will try to interpret this in my terms. I am not a cotton expert, so I am not too familiar with cotton terminology, but it has been said that our present official quality standards cover properties which account for about 40 percent of the factors that

contribute to the value of cotton in the actual processing. In addition to the things that our present standards cover, we have such factors as tensile strength and things not included in the standards. I am not familiar with all these factors, but I would like to develop this point a little further.

Mr. WHITTEN. I might interject, with the chairman's permission. Having dealt with this subject through folks who knew more about it than I do, a whole lot depends on having an even staple. The tensile strength of a given lot of cotton is of very little value if it is going to be mixed, some parts of it weak, some parts stronger. You need to get one grade or quality together, and efforts along that line count quite a bit in increasing the strength of the finished product.

RESEARCH ON EVALUATING QUALITY OF RAW COTTON

Dr. TRELOGAN. The purpose here is to develop ways and means of finding out whether it has uniform strength or not so that the buyer will know what he is getting.

The work under this financial project includes a very limited amount of research designed to provide more scientific and objective means of properly evaluating the quality of raw cotton. In addition to grade and staple length, which are covered in the present Government Standards, the studies include fiber strength, fiber fineness, and other quality factors. The inclusion of these additional factors accounts for a much larger proportion of the true value of the raw cotton as reflected in the amount of processing waste, the rate it can be manufactured and the quality of the resulting yarns and fabrics. The importance of this type of work is indicated by the rapid increase during the last 4 or 5 years in the number of commercial laboratories for testing these cotton-fiber properties. Some of the larger merchants and many of the manufacturers now have their own laboratories for making these tests while others utilize the services of independent laboratories. More exact information is needed on the relationship of these fiber properties to the innumerable combinations of yarn and fabric construction produced under actual or simulated commercial manufacturing conditions. This, along with simpler, cheaper methods would encourage wider reflection of these elements of quality in the prices paid to farmers, thereby encouraging the production of the more desirable cottons and discouraging the output of the less desirable qualities.

MARKETING COSTS, MARGINS, AND EFFICIENCY

ADDITIONAL PERSONNEL NEEDS

Mr. ANDERSEN. Let us revert to project No. 1 temporarily, Doctor. How many employees do you propose to add with the increase of $21,600 requested?

Mr. STRUTTMANN. We do not have that broken down by projects.

Mr. ANDERSEN. Will you break that down for the record, please. Also show the number of employees you are proposing to add with increases requested for each of the other financial projects.

(The material requested is as follows:)

ADDITIONAL POSITIONS INCLUDED IN PROPOSED INCREASE FOR FISCAL YEAR 1954 ARE DESCRIBED BELOW BY GRADE, TITLE, AND DUTIES FOR EACH FINANCIAL PROJECT

I. MARKETING COSTS, MARGINS, AND EFFICIENCY

Measurement of costs and margins in marketing farm products (Bureau of Agricultural Economics): A GS–3 clerk-stenographer will carry out the necessary stenographic and clerical duties related to data-collection and anslysis of marketing costs and margins, including considerable work related to research contracts.

Transportation costs and their economic effects upon agriculture (Bureau of Agricultural Economics): A GS–5 statistical clerk will check schedules, compute and transcribe data from reports covering the volume of shipments of farm products, volume by various transport media, rates, and costs. A GS–3 clerk-stenographer will transcribe dictation and perform related clerical duties in connection with expanded studies into the economics of transporting farm products from the farm to the consumer.

Costs of manufacturing and distributing mixed feeds at wholesale and retail levels (Farm Credit Administration): A GS–3 statistical clerk will make statistical tabulations and calculations and prepare statistical tables on feed costs and related economic data.

Developing new educational work in marketing (Extension Service): A GS–13 extension economist, together with GS–5 secretary, will assist the chief of the division to better coordinate an expanded AMA extension program, prepare overall plans and budgets, and assist here and in the States in integration of AMA projects into the most efficient and effective educational programs; to participate in State marketing work in training of leaders, conduct of field demonstrations and rendering other assistance to the States.

II. IMPROVEMENT AND EVALUATION OF PRODUCT QUALITY

Standards for grades of processed fruits and vegetables (Production and Marketing Administration): A GS–9 marketing specialist will extend the work under this project by making studies and analyses of characteristics of citrus juice products aimed at the development of new United States grade standards for beverages containing citrus fruit juices.

Preventing the contamination of processed fruits and vegetables by insects (Bureau of Entomology and Plant Quarantine): A GS–7 entomologist will conduct certain phases of laboratory and field tests to develop methods for preventing contamination of tomatoes and peaches by eggs, larvae, and adults of the vinegar gnat.

Handling and shipping of peaches (Bureau of Plant Industry, Soils, and Agricultural Engineering): A GS–9 pathologist will develop methods for controlling post-harvest decay of peaches, particularly brown rot and rhizopus rot. Dust, liquid, and gaseous fungicides will be tested on innoculated and uninnoculated peaches of different stages of ripeness and at different intervals after innoculation. Applying treatment in packing process as well as in orchards will also be studied.

Milk sampling for butterfat content (Production and Marketing Administration): A GS–7 marketing specialist will expand development of more effective and economical techniques for sampling milk for butterfat determination at several steps in the trade channels.

Identification and certification of superior-type meat hogs (Bureau of Animal Industry): A GS–9 animal husbandman will work primarily in the field with marketing agencies, officials of State agricultural experiment stations, farmers, breeders, and extension employees on identification of meat-type swine and will develop performance standards with respect to fecundity, growth rate for their efficiency, and carcass quality. A GS–3 will perform clerical duties related to work of the GS–9, particularly correspondence and compilation of data.

Test for dry-milk solids for baking (Bureau of Dairy Industry): A GS–7 chemist will correlate chemical tests made on dry-milk solids with characteristics of bread and other bakery products that contain these solids. He will be assisted by a GS–3 aide who will prepare the milk solids by various methods, and help prepare the baked goods.

III. IMPROVEMENTS IN MARKET ORGANIZATION AND FACILITIES

Prepackaging of perishable horticultural products (Production and Marketing Administration): A GS–4 clerk would perform clerical work relating to studies of the economic feasibility of prepackaging grapes at shipping point rather than in retail stores, and new studies on packaging of lettuce at retail.

Equipment and techniques for cotton ginning and associated processes (Production and Marketing Administration): A GS–9 cotton technologist will assist in analyzing efficiencies of different conditioning, cleaning, and ginning combinations for handling mechanically harvested cotton; in field testing of cottonseed drying techniques recently developed; and in initiation of work on cleaning, conditioning, and ginning of long staple cotton.

Development of more efficient marketing facilities for handling farm products (Production and Marketing Administration): Two GS–9 industrial specialists will provide for increased assistance to local trade and other interested groups in several new areas in planning the construction of facilities of proper size, layout, and design for most efficient and economical assembling, grading, packing, displaying, storing, shipping, and distribution of farm products.

Improvement of wholesale and retail handling of foods (Production and Marketing Administration): A GS–3 clerk-typist would perform clerical work in connection with tabulation and preparation of results of training of retailers by the industry trade organizations in the proper method of preparing, caring for, displaying, and merchandising fruits, vegetables, eggs, and poultry.

Improvement in the packaging of dry beans, peas, and rice (Production and Marketing Administration): A GS–2 clerk-typist will perform clerical work relating to research data on appraising trends, packaging material, and equipment for dry edible beans, and particularly on evaluating packaging materials which would be suitable for larger consumer-sized packages.

Reduction of transportation costs by developing improved loading, storing, and bracing methods (Production and Marketing Administration): A GS–5 clerk would assemble and tabulate data resulting from research on transportation of tomatoes in all-purpose wooden nailed crates and in fiberboard lugs, and on the transportation of a wide variety of fruits, vegetables, and other farm commodities under various conditions of loading and bracing.

Storage facilities for oilseeds, fats, and oils, and their products (Production and Marketing Administration): A GS–2 clerk-typist will perform clerical work relating to research data on availability of peanut storage, study of tank storage facilities for fats and oil products for peanuts and cottonseed, and the study of storage of flaxseed at different locations.

General economics of marketing (Bureau of Agricultural Economics): A GS–9 marketing specialist will work with contractors in the development of data relating to marketing policies and practices, review reports and analyze data developed under research contracts, initiate and develop new lines of research in the field of market structure and practices.

Fresh fruit and vegetable package and container simplification and standardization (Production and Marketing Administration): A GS–9 agricultural technician would work on developing voluntary industry standardization and simplification for containers used in marketing of fresh fruits, particularly peaches, pears, and apricots. Reduction of container costs, fruit damage affected by container, spoilage losses, packing labor costs, as well as improving sales through improved packaging would be studied.

Relation of transportation costs to manufacture and distribution of fertilizers by farmer cooperatives: Economics of investment in grain elevators and equipment (Farm Credit Administration): A GS–12 agricultural economist will conduct research projects on the economic and transportation factors related to efficient fertilizer distribution and grain marketing. He will gather and analyze required data, prepare findings for publication, and represent the Cooperative Research and Service Division on technical and advisory committees under the Department research and marketing programs.

IV. COLLECTION, ANALYSIS AND DISSEMINATION OF MARKET DATA

Markets and prices for farm forest products (Forest Service): A GS–9 forest economist will assist in conducting investigations of forest-products markets and improved methods for price and market reporting services for timber products derived from farm forests.

New basic data on market supplies, movements, and prices (Bureau of Agricultural Economics): A GS–11 analytical statistician under the proposed ex-

pansion of work relating to weekly chick placements and broiler marketings, will integrate reports and analyze data on the number of eggs set, chicks hatched, in-shipments, total chicks placed, number marketed, and other related items, to provide dependable information on future marketings. Supplementing the work of the analytical statistician, a GS–5 statistical clerk will check schedules, compute, and transcribe data relating to weekly chick placements and broiler marketings.

Consumer preference, industrial market, and consumer discrimination studies (Bureau of Agricultural Economics): A GS–7 social scientist will supervise interviewers and assist in conducting surveys relating to the preference of consumers for various qualities of bread. The study involves information relating to use of various grain, milk, and shortening materials. A GS–5 clerk will check schedules and perform related statistical duties in connection with these surveys.

Factors affecting price, supply, and consumption of farm products (Bureau of Agricultural Economics): A GS–6 statistical clerk will supervise a group of clerks in preparing statistical analyses and data affecting price, supply, and consumption of farm products, with special attention to grain products.

Improvement of the effectiveness of wholesale market-news services (Production and Marketing Administration): A GS–7 marketing specialist would assist in developing additional methods and techniques for collecting, disseminating, and appraising accuracy and adequacy of present market-news services. Special emphasis would be placed on improving the service in egg-, broiler-, and poultry-producing areas and markets in supply and demand areas for the benefit of the trade and producer.

The above new positions for 1954 total 32. One GS–14 marketing specialist, employed in the Office of Foreign Agricultural Relations, is conducting surveys of outlets for United States wheat, other grains, and flour in Asia and Latin America during both 1953 and 1954. In 1953 he is stationed in Washington, D. C. and is therefore carried under "Departmental" in the detail of personal services for that year. In 1954, he will be stationed in southeast Asia in order to carry out this work, and is therefore carried as a GS–14 agricultural specialist under "Field" in that year. This shift has no effect, of course, on total positions.

Offsetting the 32 new positions outlined in detail above, 4 positions are being dropped in the 1954 column due to completion of projects and other program changes, as follows:

1 GS–12 agricultural statistician (Bureau of Agricultural Economics).
1 GS–4 statistical clerk (Bureau of Agricultural Economics).
1 GS–9 agricultural economist (Farm Credit Administration).
1 GS–11 extension economist in marketing (Extension Service).

The net increase in permanent positions as a result of the proposed increase of $250,667 for 1954 is, therefore, 28 (from 589 to 617) as indicated in the summary of personal services appearing in the second column on page 129 of the appendix to the 1954 budget.

Improvement and Evaluation of Product Quality

Work on insect contamination of fruits and vegetables

Mr. Andersen. Now, Doctor, what work do you propose to do in connection with insect contamination of fruits and vegetables and handling and shipping of peaches? And furthermore, why cannot private organizations take over this type of research?

Dr. Trelogan. First, with respect to insect contamination, the problem we encounter with the mass-processing system that we have today, and with products tending to come from mechanized harvesting, we have less opportunities for physical inspection by the human eye than we have had in the past. Insect debris may inadvertently get into the canned or processed products unless we succeed in finding mechanical or chemical or other means of detecting and removing insects. So long as we are unable to completely eliminate insects from the growing fields, special precautions must be employed in the processing plants.

Industry has wrestled with this problem for a long time. It has been one of the costly items that has confronted the canning industry.

When batches of processed products slip through with insect contamination heavy losses may result. The products may be condemned or may have to be discarded because they don't meet industry standards and may represent an outright loss. The burden of loss is frequently thrown back on the grower when infested products are rejected. Processors are seeking ways and means to avoid that type of loss as well as loss of flavor or keeping quality in treated products. Their own laboratories have been trying to perfect better methods for quite a long time. They continually come to us for basic information they might apply and for guides and leads on new techniques for handling the variety of insect problems that arise. They come to our entomologists and to our chemists for help. We have been working on a small scale with a few methods for eliminating insects, but we haven't any more than scratched the surface. We have been trying for several years to get more effective work going. We have been able to provide an entomologist to work on the problem but we have not been able with the funds available to provide a chemist so they could work as a team. We feel this kind of a team or teams are required to be in position to help industry to the fullest extent possible with the numerous types of problems that come up considering all the different commodities and all the different types of processors who seek assistance. It is not a small problem. If we were to carry out the job completely it would be a very large one, but we are trying to provide only a nucleus of qualified men with authoritative information who will be available to work with industry and to do a limited amount of experimental work trying to develop some new ideas to give industry the leads and the help it needs. You had another question with respect to peaches.

WORK ON HANDLING AND SHIPPING OF PEACHES

We are seeking a maturity test for peaches that will be suitable in establishing standards and measuring maturity of peaches at the time they are delivered to the packing plant or in the market so they will reach consumers in the condition that is most satisfactory. You will recognize that the consumer likes a tree-ripened peach but a shipper wants a hard peach because he wants something that will withstand the rough handling incurred in getting the peaches to market. If the shipper gets peaches that are too ripe, he is apt to be coming up to the retail store with badly bruised and rotten peaches. If he gets them too green, they come up to the retail store in an immature condition that the consumer does not like. For the management of some control activities conducted by the industry as well as under marketing agreement programs to assure delivery of acceptable peaches, standards of maturity need to be established and the acceptability of the peaches measured as they are delivered. We have done considerable research on this problem in the last year or two in the East, with some degree of success, but the folks in California maintain that similar tests need to be developed for the peaches in their area. They have different varieties and different conditions and they are insisting that this is a particularly imeortant problem in their area. Both the California State Department of Agriculture and the peach industry are asking for assistance on developing the tests that can be used by them.

Mr. ANDERSEN. It would seem to me that as a result of experience gained through the years it would be almost second nature for these peach growers to know when to pick and ship.

Dr. TRELOGAN. I can only say that the industry advisory committee as well as other industry representatives and the California State Department of Agriculture do not accept that judgment and say they need some sort of physical or chemical test that will avoid reliance on human judgment which is so erratic. As a matter of fact, the deciduous Fruit Advisory Committee at is February 1953 meeting placed this as the No. 1 problem in the marketing field.

Mr. ANDERSEN. I presume the same thing applies when you put bananas aboard ship.

Dr. TRELOGAN. I suspect.

Mr. ANDERSEN. In the final analysis, is it not the judgment of one man as to when a commodity is picked and sent out?

Dr. TRELOGAN. That is the problem here; the determination is made by many growers as to when to pick the fruit. These growers do not exercise uniform judgment. Consequently, receivers or packing houses have to reject peaches that are delivered to the assembly points. Without an objective test, growers are not satisfied that their judgment is wrong and that the peaches will not be in proper shape when they reach the consumer markets.

Mr. ANDERSEN. That is a lot of money, $107,000 additional for that one project. It just seems to me it is quite an increase. It looks like you folks come in here with about the same percentage increase each year. Last year we gave you an additional $80,000. You must have impressed the committee, because we did give you $80,000 above 1952 for that particular project.

Dr. TRELOGAN. I can only assure you that we are treating only a fraction of the problems that are being presented to us for attention in this area. The advisory committees and others are requesting far more work in the area than we are able to do.

Mr. ANDERSEN. You are having a lot of pressure from advisory committees on this?

Dr. TRELOGAN. I do not say pressure—recommendations.

Mr ANDERSEN. At least suggestions.

Dr. TRELOGAN. This is an area that interests them a great deal. It is tangible. It is clear cut. They can identify the problems very clearly and they are anxious to get help in trying to solve them.

IDENTIFICATION AND CERTIFICATION OF MEAT-TYPE HOGS

Mr. ANDERSEN. In that same program, there is an item which has to do with the identification and distribution of superior types of breeding stock for meat hogs.

Dr. TRELOGAN. That is right.

Mr. ANDERSEN. Are you referring to such as Minnesota No. 1?

Dr. TRELOGAN. Yes, sir, but we are not referring to particular breeds. We are trying to establish a means by which we can identify in the market place for the prospective buyer those hogs which will be suitable for producing meat-type swine regardless of breed.

Mr. ANDERSEN. Is that not a little bit out of your field? Should this not be part of the regular breeding program of the Bureau of Animal Industry?

Dr. TRELOGAN. Let me explain that, sir. We are trying to get a method by which we can establish market identification. We know breeders have developed the hogs. We know the meat-type is not confined to any one or two breeds; it is found among hogs of several breeds.

Mr. ANDERSEN. Your work is in identification of this meat when it is on the hooks, so to speak?

Dr. TRELOGAN. Not the meat.

Mr. ANDERSEN. The hogs when they come to market?

Dr. TRELOGAN. The breeding stock offered for sale on the market.

Mr. ANDERSEN. You are referring to breeding stock. I still ask if you are not getting a little bit out of your field. You are not dealing with a product as yet.

Dr. TRELOGAN. This is a product in the sense that it is bought and sold by farmers; they buy and sell them. We need to have a method of identifying the quality for the prospective buyers. We rely upon scientists in the Bureau of Animal Industry to work this out. They are the same people who work with the breeding program who help us here in conjunction with this proposal. Plans prepared in cooperation with several Eastern States have been working out to develop a system that will provide for market identification of meat-type hogs. The purpose here is to try to facilitate and expedite the more rapid adoption of the meat-type hog on the farms. The ultimate objective is to alleviate the surplus lard problem by helping farmers more rapidly to adopt the production of meat-type hogs. One of the difficulties to be overcome is to enable farmers to know and have confidence that they are buying the meat-type hogs when they are selecting breeding stock offered for sale.

Dr. SHAW. Mr. Chairman, I think one additional point is we all agree that the development of a meat-type hog is one of the things we want to look forward to in terms of helping to solve the fat problem that we have. But we can never accomplish the solution until the buyer will recognize premium quality—and pay for it.

Mr. ANDERSEN. My only question, Dr. Shaw, is whose business is it to take care of that item? It does seem to me it is not really an item having to do with marketing specialists. I will grant that consumers desire that type pork, but aren't you encroaching on the field of the Bureau of Animal Industry?

Dr. TRELOGAN. The Bureau of Animal Industry does this work.

Mr. ANDERSEN. That puts a different light on it. I will remove my objections on that because I think that that is the proper spot for it to be done.

Dr. TRELOGAN. We do, too.

Mr. ANDERSEN. We have had quite a bit of discussion on the possibility of duplication throughout the Department.

Dr. TRELOGAN. You recognize that this is a little different problem than the breeding of the hogs?

NEED FOR REDUCING LARD CONTENT OF HOGS

Mr. ANDERSEN. I understand you want the meat product and you want to encourage the production of it. Of course it does mean a lot to the hog industry if we can get a lower percentage of this lard that is encumbering the market. That is what sets the price of pork in the final analysis. That is about the situation, is it not?

Dr. TRELOGAN. Yes, sir.

Mr. ANDERSEN. I have produced enough hogs in my time to know that.

Dr. SHAW. Actually, we are getting meat-type hogs produced but the buyers are not paying a premium for them so there is no incentive for the farmer to push them. We have to get a situation where the buyer will recognize the superior quality and pay for it so that the farmer can be encouraged to go into meat-type swine production.

Mr. ANDERSEN. Thirty years ago I produced Yorkshire hogs with that in mind, in contrast to my neighbors producing Duroc Jerseys, Chester Whites and Poland Chinas. I remember straight Yorkshires were at that time, along with the Tamworth, the outstanding bacon hogs of America. I am referring to a period 30 years back.

You do encourage the large packers to recognize the value of meat-type hogs and pay in accordance with that value, do you not?

Dr. TRELOGAN. Yes; we do. We have taken several approaches to that problem. One has been to do the research work that will enable them to figure out methods of identifying the hogs that have a large proportion of meat compared with fat or lard. Another phase of it is to establish standards and promulgate grades that will enable the packers to pay for the hogs on the basis of their market value in terms of the percentage of the primal cuts—the higher value cuts of the animals. A third approach has been to try to measure the amount of premium that would be warranted.

Mr. ANDERSEN. How much do you anticipate you could increase the value to the hog producers if we could change from lard hogs to meat hogs?

Dr. TRELOGAN. We have been doing work on that for some time. You recognize that the answer to this question depends on your price level.

Mr. ANDERSEN. Let us go on the basis of pork price, approximately $18 a hundred.

Dr. TRELOGAN. I will give you a conservative guess on the basis of preliminary figures I have seen; something on the order of 50 cents a hundred pounds. That varies considerably with the size of hog and also varies with the price level, and we are talking about today's prices.

Mr. ANDERSEN. As was mentioned previously, the hog business is a big industry. It has represented about $5 billion gross income annually in the past few years to farmers of America. And, of course, whatever can be done to raise the net profit to the producer would be more than welcome to agriculture. It might help to solve a lot of difficulties.

WORK ON UTILIZATION OF FATS AND OILS

Dr. TRELOGAN. That certainly is true, sir, and it would solve some of our problems of disposing of the lard which is part of the general surplus fat situation.

Mr. ANDERSEN. The ability to get rid of the lard is what really establishes the value of the hog, is it not?

Dr. TRELOGAN. In large measure.

Mr. ANDERSEN. Do you know the wholesale price of lard today in the market?

Dr. TRELOGAN. In the neighborhood of 8 cents, but I am not positive.

LARD PRICE INFLUENCES HOG PRICE

Mr. LENNARTSON. That figure was the low; it is around 10 cents.

Mr. ANDERSEN. I believe that is correct. But it is my understanding that when lard is around 10 cents wholesale in Chicago, it more or less puts a ceiling on what the packer can afford to pay for the live hog.

Dr. TRELOGAN. That has been the rule of thumb of the past but they have found that the lard is now well below what they have to pay for the hog and that is what is concerning some packers and others who are now being stimulated to take greater interest in trying to produce the meat type hog—more of the meat type hog compared with lard type hog.

Mr. ANDERSEN. In your studies of ways and means by which to make better markets for hogs, do you make studies of the effect of competing imports?

Dr. TRELOGAN. Yes, to some extent, sir. We have this kind of work in the Office of Foreign Agricultural Relations where men are sent abroad to find out what are the prospective supplies that are being produced in foreign countries that will be in competition with our own, either in markets abroad or at home.

EFFECT OF IMPORTED OILS ON THE DOMESTIC MARKET

Mr. ANDERSEN. Generally speaking, foreign coconut oil, vegetable oils, and such are in direct competition with fats in this country, are they not?

Dr. TRELOGAN. Yes; we have had two or three emissaries go to study the fats and oils situation with respect to production from other countries that will be in competition with fats and oils produced in this country.

Mr. ANDERSEN. We are having difficulty with butter today. Will we ever solve these difficulties unless we do something to protect our own producers against imports of competing products?

Dr. TRELOGAN. On the basis of the research in this program, I am afraid I could not answer that.

Mr. ANDERSEN. Can you answer that, Mr. Wells? How can we expect to hold up the market price in this country of things such as pork and butter?

Mr. WELLS. In case of American products, it is going to take some protection. At the present time, I believe that all imports of butter and butterfat are embargoed with—can you check me, Mr. Walsh?

Mr. WALSH. That's right.

Mr. WELLS. Under authorities that trace back to World War II or the Defense Production Act. With respect to butterfat, you perhaps realize dry whole milk began to come in in very considerable volume last fall. In fact, we were receiving the fat in the form of dry whole milk rather than butter. A limit was placed on that in December and there are quite a few places——

Mr. ANDERSEN. I understand that has been embargoed. But I am referring to the larger problem. Take any competing fats and oils. Why should not our own people, why should not the cotton people down South, the soybean people up my way, and the hog producers all through America, have the right to our market before

we open up our gates to these competing fats and oils which we cannot compete with because of the cheapness of the labor which produces them. I think that is really the basic solution to this whole problem. I think we are always going to be bothered with that, gentlemen, until we do something to regulate our own supply and demand right here in this Nation.

INCREASED TREND TOWARD SUBSTITUTE BUTTER AND LARD

Dr. Trelogan, for the record, do you not feel that perhaps a part of the difficulty that we are in relative to butter and lard is the fact that those two industries are competing with highly developed advertising talent on the part of competitors? I have reference to certain television programs, for example. You can see on those programs advertisements relative to Spry and to Crisco and others that almost make your mouth water. You do not see any advertisement as to the benefit of good old lard. You never see that. The same thing applies to butter. You can see program after program and beautiful placards in streetcars having to do with the various brands of oleo, but you scarcely ever see any advertising of butter. I think we fall down in advertising of these down-to-earth products from the farm. I do not know whose job that should be, but don't you agree that this is a factor?

Dr. TRELOGAN. There is something to that. These older, well-established products are meeting more intensive and vigorous competition. Merchandising of the newer products that are coming in is very effectively promoted and is not being met with retaliatory measures of the same type to the same degree. I don't think it is proper to say we don't see any of it. We do see some.

Mr. ANDERSEN. But very little.

IMPROVEMENTS IN MARKET ORGANIZATION AND FACILITIES

In relation to project No. 3, describe the work you perform relative to mechanization of market operations and facilities.

Mr. TRELOGAN. At the close of the hearings yesterday, Mr. Chairman, Mr Horan indicated he wanted us to have some pictures and reports on the work in terminal markets. We have Mr. Crow with us and he is prepared to do that if you want the material presented at this time.

Mr. ANDERSEN. I think it would be interesting to the committee.

Mr. CROW. I am William C. Crow, Director of the Marketing and Facilities Research Branch, PMA.

All the work that we are doing on market facilities and on reducing the amount of labor required for performing market operations is aimed at trying to find ways of holding down the cost of marketing. It is apparent to all of us that we cannot improve the marketing system's efficiency by wiping out the system we have and by some magic formula bringing another one into existence. So we are taking specific operations in the marketing system where we find a great deal of inefficiency and high cost and are trying to find less expensive ways of doing that particular job.

IMPROVING TERMINAL MARKET FACILITIES

One type of work that is essential if the marketing system is to be made more efficient is improving the facilities that are used for marketing—the buildings, their location, their size, their design and layout. I do not know how much time you want to devote to describing the inadequacy of marketing facilities since this was fully discussed 2 or 3 years ago. Some of the members of the committee may be interested, but it will be repetitious to others.

Mr. ANDERSEN. Go ahead, sir; it is interesting.

Mr. CROW. You may recall that inefficient marketing facilities has been the subject of five Federal investigations over the years. The first was in 1917, another one in 1921, another in 1936, another in 1945, and one in 1950. The 1921 investigation was made by a joint commission of Congress. The last two were made by the House Committee on Agriculture. The ones in 1917 and 1936 were made by the Federal Trade Commission at the direction of the Congress. In each case concern was expressed over the fact that marketing facilities at various places between the farmer and the consumer, particularly in large cities, are antiquated and inefficient, but even so they continue to be used. One of the things we have been trying to do as directed by the Agricultural Marketing Act is to develop concrete plans for improved facilities in the various places. The facilities in the large eastern terminal markets are the ones which I believe Mr. Horan was particularly interested in having discussed.

Most farm products, as you know, move through terminal markets of some kind, even though a great deal of bypassing of terminal markets has developed in the past quarter of a century. For instance, fruits and vegetables, poultry, meat, eggs, butter, cheese and the various other products move in large quantity through such markets as New York, Chicago, Los Angeles, San Francisco, Kansas City and other cities.

This map shows, for instance, the source of the fruit and vegetable supply of New York City. The pies in these 44 States represent the volume of fresh fruits and vegetables, which is just one type of commodity, moving from each State into New York City. You may be interested to note that one-fifth of them come from the State of California. Another fifth from Florida. Roughly one-tenth of all the food products produced for sale in this country are consumed in the New York metropolitan area, so it is a very important market.

If shipments of poultry, eggs, flour, butter, cheese, and meat from each State were shown on this map, it would be evident that New York is a major market for products grown in every State.

LARGE CITY MARKETS DETERMINE NATIONAL COMMODITY PRICES

In these terminal markets, such as New York, prices are established which are used as the basis of determining prices of products sold in other parts of the country. So they are our price-making centers, and if they do not function efficiently, the effect is felt not only on the farmer who sends his products there (who gets the retail price less all the deductions for marketing costs), but also by the farmer who sells his products elsewhere on the basis of prices established there.

In these large city markets facilities for the most part are quite antiquated. For instance, if you were to go to Boston, you would find that they are still using as their principal market district the old Faneuil Hall area where, incidentally, Paul Revere served as one of the market officials. In New York City, Philadelphia and many other places you would find the same situation existing. Here is a picture that shows how crowded the conditions are. This picture happened to have been taken in Philadelphia but it could just as well have been taken in any one of several large cities—you could not tell the difference. All the produce you see in the picture is stacked on the sidewalk and out in the gutter. There is nothing in the picture that is inside the wholesaler's store because the stores are so small that they could not get the products in there.

The markets were located in these areas long ago when the city was small, and streets were narrow. When the railroad was invented, it was impossible to get the tracks to the market area so supplies that arrive by rail must be trucked with a substantial cartage charge, plus damage to the product, into these market districts. In the market districts the streets are so narrow that the traffic congestion is terrible. In the New York City market which I had the privilege of visiting sometime ago with members of the Committee on Agriculture, we went through the market, saw the traffic congestion and found that there were places for 400 trucks to load or unload at the stores at one time, while there were 1,350 vehicles at the peak of the day trying to get to those spaces. The ones that could not get there often just gave up, and the products were carried by porters on their shoulders or on two-wheel hand trucks between the trucks and the stores for distances from a few feet to a block.

Here is a picture of the main street of the most important market for perishables in the United States—New York City's Washington Street market. The poultry, eggs, fruits, and vegetables are handled at wholesale on this street or adjacent streets which are of the same width. You will notice that the street is wide enough for only three lines of trucks to move down it. The trucks cannot park at right angles to the curb so they have to park parallel and each truck will take 30 to 35 feet, depending on its length. Thus it is impossible to get very many of them up to the store at any one time and when trucks are loading or unloading on either side of the street there is room for only one lane of traffic in the middle. That is characteristic of the large city markets and you find it in markets in smaller cities also. When the trucks do get to those stores, if they do, some of the produce never gets into the store because there just is not room to put it there. The stores are too small, so as you saw in that other picture, they stack the products on the sidewalk. Everything has to go in and out the front door. The stores usually average from 20 to 25 feet in width, which does not provide much space.

There is not enough room for most of them to have refrigeration rooms, so lettuce that comes from California with the best of refrigeration is stacked on the sidewalk. For lettuce coming to New York City, as an illustration, the railroad line ends over in New Jersey, so

the cars are floated across the river on a car float or ferry and are unloaded on piers out by the river. Products that come by one railroad are unloaded on one pier and those which come by another are unloaded at another. Products are unloaded at some 60 different places in the metropolitan area. Obviously, the retail grocer cannot wander around to 60 different places to obtain a complete line of products, so a large portion of the products must be trucked to the Washington Street market area at a cost of millions of dollars per year.

Mr. ANDERSEN. Mr. Crow, this would seem to indicate that, at least in this line of endeavor, we do not live up to our usual efficiency in this Nation.

Mr. CROW. We do not.

FACTORS RESISTING IMPROVEMENTS IN MARKETING FACILITIES

Mr. ANDERSEN. Is it lack of interest by the various cities affected or what?

Mr. CROW. I think 2 or 3 things are responsible for that. One is that wholesalers in this kind of business for the most part are little fellows without large resources. They live by their wits and many live on a day-to-day proposition, so they do not plan for the future. Furthermore, the retail grocer who is buying these perishable food supplies wants to go to an area where he can find the greatest variety of products and the most wholesalers. Thus, it is difficult for one of these wholesalers to move out by himself if he expects the buyers to come to him because the buyer will continue to go where most of the products are. So the dealers have to move collectively and there is a real problem of organization to get those people as a group to develop and move into a new wholesale food district.

EXPENSIVE TRANSPORTATION METHODS

This carload of lettuce that I mentioned would be unloaded on the piers at a cost of some $40 to $45. Then it is trucked about two blocks to stores shown in the picture which you saw at a cost of about $50 a carload. It will cost $15 or $20 more for porterage to get it from the truck to the sidewalk or into the wholesale store, so the cost of getting that product out of that car and into this wholesale store is well over $100. This is the actual physical handling cost. I do not know what the cost of damage to the product would be, because I do not know how to measure that, but obviously it is something. If the railroad track came up to a building of the proper type, it would be possible to unload that carload of lettuce into a wholesale store by the right kind of handling methods for $9 a car. So there is a waste of about $100 per car in that particular operation.

When I was going through this street with the Committee on Agriculture we looked to see if we could find any modern handling devices in this market. Finally, after much searching we found in the back of one store a 10-foot piece of roller conveyor not being used. The reason why it was not being used, of course, was rather obvious because in facilities of this kind you simply cannot install modern handling equipment.

SUPPLEMENTAL RAILWAY TERMINAL MARKETS

When these markets become so overcrowded that they simply cannot handle the volume of products required by the city, markets of limited use have been built to supplement them. There are a few places such as Philadelphia where some railroad has built a freight house, so to speak, 2 or 3 miles out of the market district and told the people that they can handle food there but that in order to be able to use this "market" they will have to send the food in by that particular railroad. Then some other railroad will build a similar "market" with the same strings attached. That does not solve the problem because no railroad brings in a complete line of products. Retailers want to obtain a complete line in one area, so many of the supplies will have to be trucked from the new "market" into the old market and handled again. Of course, the large buyer like chainstores can go to one of these railroad-owned markets and get a complete truckload of a few commodities but smaller retailers cannot.

URGENT NEED FOR NEW WHOLESALE FACILITIES

Here is another picture that I think you would be interested in; It shows the principal market in Philadelphia in the year 1880. Here is another picture taken from the same position as the market looks today. The only thing changed is the photography, and trucks have taken the place of wagons. One of the things that we are trying to do, then, under this act is to develop plans for efficient market facilities. We never do this work except on request, and never except when there is enough local interest that it looks like something will be done about the situation if plans are developed. We have made a study in Boston, for instance, where the annual volume of perishable foods handled is 95,000 carloads worth half a billion dollars. After studying the operations there we developed plans for a new consolidated wholesale food district.

On this map of Boston, here is the Faneuil Hall district. Some outlying markets built by the railroads and farmers are scattered around the city. Those of you familiar with Boston know how it is divided by rivers so that the large amount of crosshauling among markets is difficult and expensive. Here is a picture of Old Faneuil Hall Market, which is the principal market. It was taken on Saturday, when they had very little business, and after the business day was over, but I think you will agree that it would have been impossible to get any more trucks in that street at any time.

CONSUMER PAYS FOR INEFFICIENT MARKETING

Mr. WHITTEN. I think it is very much apparent that all of that wasted motion and extra cost, trucks delayed, and all of that, is reflected in an increased price the consumer pays when he buys the apple, the lettuce, or whatever product it is.

Mr. CROW. Some studies made by the city of New York several years ago emphasize your point. They showed that about 48 cents out of the consumer's dollar spent for fresh fruits and vegetables in New York City went to pay the cost of handling those products after

they reached the city limits. The other 52 cents went to pay the cost of getting them there and paying the grower for producing them.

Mr. HUNTER. Could I ask a question there? Then your investigation would show that no one is necessarily getting rich at the expense of the farmer. Is it rather that these antiquated methods and duplication of efforts are adding to the cost?

Mr. CROW. That is right. As a matter of fact, a fair portion of these dealers go broke every year with others taking their places. Their costs of operation are so high they cannot meet them. When we were in New York City, one wholesaler with a store about twice as big as this room was asked how much rent he paid.

He replied, "$15,000 a year." A one-floor operation. But you see, there is a premium on space there. There just is not room. The market is right in the shadow of the skyscrapers in New York City. This Faneuil Hall district is similarly located. Land values are high. The facilities are as poor as you can imagine.

APPROACH TO MARKETING STUDIES

We go into these places to study the situation only if we have the promise of cooperation of the handlers, city officials, farm organizations, and of some State agency to work with us, either a college or the Department of Agriculture. We study the methods of handling being used. We determine where everything is being unloaded, what it costs to get it unloaded and moved from the place where it is unloaded to the next place and the next, and so forth. Then we try to find every item of handling, the inefficiencies, and the cost of them. When we get through analyzing the situation, we determine what kind of facilities would reduce the cost of handling the products. For instance, there is only one way to reduce the cost of cartage from the railroad to the wholesale house and that is build a facility where the railroad track comes to the back of the building with a platform so the car can be unloaded directly into the wholesale house.

The only way to eliminate traffic congestion is to make streets 140 feet wide instead of 30 and have rear entrances to the buildings as well as front entrances. This will give you an idea of how we go about analyzing a situation and proposing a cure. We determine the amount of space needed, the best location for a market, its cost, and the savings it will bring. When we finish the study we present the findings to all interested groups by use of scale models. I might add that these dealers cooperate fully in giving any information that is needed because they are troubled about their situation, and desire better conditions.

COOPERATIVE INTEREST IN MARKET FACILITY IMPROVEMENT

Mr. ANDERSEN. Have cooperatives shown much interest in this problem?

Mr. CROW. Interest, yes. I have talked with representatives of many of them about taking an aggressive part in it, and they say they can't do much about the large terminal markets, because for the co-ops to assist in financing facilities the sales in the markets must be largely by farmers, and in these large markets the sales, while for farmers, are largely not by farmers. For instance farmers in Cali-

fornia are too far away from New York to sell their own products there.

Mr. ANDERSEN. Perhaps the answer is for the large cooperatives back in California to follow its produce right into New York City, and through their own cooperatives sell at wholesale.

Mr. HUNTER. You then get co-ops further into wholesale-retail business. Then you get more criticism of cooperatives. The matter of taxation of cooperatives comes up again.

Mr. CROW. They have an economic problem too if they do that, because if a cooperative selling citrus fruit or some other product were to open a wholesale house outside this market district the average little retailer would not go to it to get his oranges, because he has to have many other items besides oranges and he can't go to a large number of places to get them. Thus the co-op would probably find itself having to deliver those products to the retail stores.

Mr. ANDERSEN. Which would not be an impossibility.

Mr. CROW. No, but it is costly to run a different truck to every little retailer to deliver each commodity or commodity group.

Mr. ANDERSEN. That is correct, but a cooperative could handle 15 or 20 different kinds of vegetables.

Mr. CROW. If they could handle a substantial number this approach would be more likely to succeed.

Mr. ANDERSEN. I have been a great believer in private enterprise. But if private enterprise falls down, I think it is proper for co-ops to step in. That has always been my viewpoint.

COST COMPARISON IN MARKETING OPERATIONS

Mr. Crow, will you place into the record at this point an analysis of the differences in cost between a market which you would consider efficient and well equipped to do the job, and the inefficient markets we have been discussing in some of the big metropolitan areas. Do you have certain markets in mind that you could use for such a comparison?

Mr. CROW. Yes, I think I have. We have developed plans which have been carried out substantially in line with our recommendations in some 18 cities and in those cities, many of these wasteful practices have been corrected. One of these cities is San Antonio where the new market pictured here started operation about a year and a half ago. You will notice that in contrast with the older markets of the East, the railroad tracks are brought up to these buildings. The floors of these stores are at the same height as the floor racks in the refrigerator cars. Dealers have the right kind of handling equipment for unloading the contents of cars into stores. Therefore, in the San Antonio market the cost of unloading produce from a car into the store is about $9 a carload, as contrasted with the more than $100 a carload cost that I mentioned a moment ago for getting the California lettuce through the piers into the wholesale stores on Washington Street in New York. That saving is on cartage alone. I would hasten to say, however, that in many of these old markets the cost of getting the produce from the car into the wholesale houses is not as much as in New York, but is only $40 to $60 a car. But with properly built markets this task can be performed for $9 to $10 per car.

Mr. ANDERSEN. That would be quite a saving.

Mr. CROW. It is very considerable.

Mr. ANDERSEN. Will you assemble whatever data you may have in connection with these comparisons and put them into the record at this point?

(The material requested is as follows:)

COST ANALYSIS OF IMPROVED MARKETING FACILITIES

The rent being paid for stores in the Dock Street market in Philadelphia averages about $400 per month, and in New York the figure is higher. Stores built according to our plans in other cities usually rent for from $200 to $225 per month, and in a few places for as low as $100 per month. Of course for such rents to be possible the markets cannot be constructed in the heart of the business district of a city. In one city, a wholesaler told me that he saved enough in the cost of unloading banana trucks in a new market to pay the rent on his store. In another city after wholesalers had occupied the new market for a year they stated that their operating costs were down about 20 percent and their volume of business was up by about the same percentage. In all new markets, with which we are familiar, spoilage losses are down, traffic congestion is practically eliminated, time of buyers and sellers is saved, and the cost of loading delivery trucks is materially reduced.

Our studies show that in nearly all cities it is possible to reduce distribution costs by operating in modern facilities. For instance, if our proposed plan were carried out in Boston (and part of it is under construction) distribution costs could be reduced by some $4 million per year. In many other cities the annual savings expected would amount to from one-fourth to one-third of the cost of the facilities. In a warehouse built according to our plans, handling costs were less than 20 percent of such costs in the old warehouse. In Report 972 of the 82d Congress the House Committee on Agriculture reporting on its investigation on markets said: "There are good reasons to believe that total annual savings to the public that would be expected from improving market facilities in the larger cities of the Nation would well exceed $100 million per year."

Mr. CROW. You might be interested in seeing this picture of another one of the newer markets. This is in Columbia, S. C. There is another one in Jackson, Miss., as you know, and others in Atlanta, Augusta, Miami, Greenville, S. C., Dallas, and St. Louis.

Here is a picture of a market that opened last fall in Hartford, Conn., and here is one with modern facilities in the city of Buffalo, N. Y. The construction of this one, incidentally, antedates the ones I have mentioned.

Mr. WHITTEN. Mr. Crow, if the chairman will permit, I should like to congratulate you on the very splendid presentation you are making here and for the very fine and hard work that has gone behind it. It lives up to the splendid reputation you made with this commitee in handling the freight-rate problem.

NEED FOR ORGANIZED CONSUMER GROUPS TO EFFECT IMPROVEMENTS

What I would like to raise here is that, in spite of the very fine showing that you have made in the Department of Agriculture and the most conclusive evidence that you present, we unfortunately are not in a position to effect a cure. I am wondering if there would be any way to set up a joint commission or study group or research project whereby this would be handled by you as a representative of the Department of Agriculture and a similar group in the Department of Labor which is more closely identified with organized consumer groups,

on the basis that if the story you present to us here was fully appreciated by the Labor Department and by those that are more closely identified with organized consumer groups, I don't think there is any question but what pressure would come about in those areas to effect a cure. While we are looking at it as a cause of depressed price to the farmer, actually, I should think that probably it shows up in a much greater way as inceased prices to the consumer.

Mr. CROW. We would be very happy to work with any group in the Labor Department or elsewhere that can help on the problem.

You may be interested in knowing that in some of the cities I have gone directly to the labor-union officials and put the problem up to them in exactly the way that you mentioned and I am very happy to say that in some of these places the labor organizations have cooperated with us. I was quite surprised when I returned to Washington after making a presentation of our recommendations in one city to receive a call from the Congressman from the district in which the city is located saying that on the night after the presentation was over, the heads of the two principal labor unions in the city had called him and told him that they were very much in accord with the idea presented and were going to support it. That is the most outspoken case of labor support that I have. The Congressman was Mr. Burnside of West Virginia whom you know.

FACILITIES IN SMALL CITIES ALSO STUDIED

I would like to make another point before we leave this question of facilities. By the amount of time we spent on terminal markets, it would imply that the only kind of market facilities we work on are the markets in the big cities. That isn't correct because, where there is inefficiency and a request, we also aid in developing plans for assembly markets, packing plants, livestock auctions, warehouses, grain elevators, frozen-food plants, and retail stores. I am not going into our work on these types of facilities but I didn't want to leave the impression that the only place where improvements in market facilities are needed is in the big cities, because some of the others are badly in need of improvement.

IMPROVING HANDLING METHODS AND EQUIPMENT

In addition to having buildings or facilities efficient, it is extremely important to have the right kind of equipment and labor-saving devices in those buildings or facilities. Thus determining the kind of handling equipment and methods best suited to different types of facilities is another type of work we have gotten into under this financial project of the Agricultural Marketing Act since the last time I appeared before this committee. The results of this work in the materials handling field have been well received, because there are many places where new facilities cannot be built and the only way to get increased efficiency is to improve the handling or reduce handling costs in the old facilities. Of course the new facilities can be designed to make possible the use of the best kinds of handling equipment and methods.

Mr. HUNTER. Including the use of pallets and lift trucks?

Mr. CROW. Yes. As I believe was pointed out yesterday, over half the marketing bill is labor cost. There is a great deal of handling and rehandling of products, picking them up, setting them down all the way through the marketing system. This repeated handling is one of the things that runs the cost up.

IMPROVEMENTS IN COTTON HANDLING

We are trying to find ways to eliminate any handling we can and to make more efficient that which cannot be eliminated. One of the things that we have done in that field, Mr. Whitten, is in handling cotton into, within, and out of warehouses. This study is being made at the request of the Cotton Compress and Warehouse Association research committee. They pointed out that cheap labor had been used in the South for years to handle cotton, but that labor is no longer cheap and during the ginning seasons they often do not have enough labor to get cotton into warehouses. Hence it was necessary to find more efficient methods. This committee pointed out that they had tried unsuccessfully to develop the improved methods they need.

As you know in the compress, they store cotton and later move it to the dinky press. The usual way of doing that is to have a number of hand-truck operators move a bale at a time from the storage point to the press. It takes ordinarily eight men with hand trucks to supply the press, as is shown in this picture. We introduced the idea of a "temporary block."

With this method instead of having 8 truckers stand in line, each waiting his turn to put his bale into the dinky press, 2 were stationed at the "temporary block" to feed the press and 4 were able to keep that pile of cotton at the temporary block supplied. This reduced the number of men needed for the operation from 8 to 6 without changing the equipment, as shown in this picture. After having introduced this method, we suggested that the hand truckers be replaced with an industrial clamp truck with which one man can dump the cotton in the pile as fast as the dinky press can take it. So 3 men did the job that 8 had formerly done, as illustrated here.

Mr. ANDERSEN. How does it happen that they hadn't thought of that thing before?

Mr. CROW. I do not know. As a matter of fact, we often are told that our ideas will not work, and sometimes are surprised to find out later that persons who say they won't work are using them.

LABOR SCARCITY INDUCES EFFICIENCY STUDIES

Mr. WHITTEN. In the first place, many times they are set to the old system. Most of the time there has been plenty of labor and many people who need to make a living. There may be an obligation on the part of a warehouseman to supply a means of a living to people who have been with him for years. He gets into this kind of system and continues it. On my father's farm they used to cut wood back in the early days to operate a cotton gin. Wood was burned generally. They didn't do away with the wood-burning system for years after they might have because we had families living on the farm who needed some means of livelihood in the nonfarm season, and this cutting of wood and supplying it to the gin was a means of enabling such farmers to have an income during the midsummer. Many of

our systems of operation frequently have grown up in that kind of way. When you go to try to break it down, it is hard to do. One reason you have been able to do so in the last few years more than before is the present shortage of labor which is putting the pressure on.

COTTON-WEIGHING IMPROVEMENTS

Mr. CROW. This is the best time we have ever had to get labor-saving devices introduced because of the scarcity of labor. Another illustration of our cotton-handling work is the weighing of the cotton. The old beam scale usually used for weighing cotton takes a large number of men. This picture shows the customary way of weighing it. We proposed that one way to reduce the labor in weighing was to put rollers on the beam scale and roll the scale over a row of cotton bales instead of lining up all those hand trucks with the cotton to feed on the scale.

In Brownsville, Tex., one warehouseman, by adopting that mobile-beam scale, eliminated 16 hand truckers.

Mr. ANDERSEN. You might say, Mr. Crow, that this is a process of evolution as far as better methods of handling are concerned. In certain areas they no longer have available help that they had formerly, and they have to do something toward keeping in competition.

APPROACH TO STUDY ON HANDLING EFFICIENCY

Mr. CROW. What we are doing from the standpoint of trying to cut handling costs is this: We are trying to pick those places where it seems there is the most waste, an operation there, another here, and trying to find a way to cut out that waste. It is my own belief that the only way we will cut down marketing costs is to find specific places in the marketing system where something is wrong and find a specific way to correct that inefficiency. Viewing the whole situation with alarm won't do any good.

COMPETITION BY DEPARTMENT WITH PRIVATE EFFICIENCY STUDIES

Mr. ANDERSEN. Are you encroaching into the sphere of efficiency experts? Are you doing work that an organization could employ an efficiency expert just as well to do?

Mr. CROW. Well, we are not working on any problem if we can find that someone else is solving it, and making the answers known to the public. In this instance, the answers were lacking.

We are issuing reports such as these of our findings so they can be adopted.

CHARGE BY DEPARTMENT FOR PERFORMING EFFICIENCY STUDIES

Mr. ANDERSEN. Does the Department charge for such services?

Mr. CROW. No.

Mr. ANDERSEN. Why not?

Mr. CROW. The chief reason is that much of the benefit that the improvements in efficiency that we are trying to bring in this materials-handling field in the city markets, in the warehouses, in the packing sheds and so on through the marketing system, while reducing the cost of handling at these various places in the marketing system,

is going back to the farmer or the consumer. So, there is a question of who would pay the charge.

Mr. ANDERSEN. You are doing it basically as research, but you don't like to get into the private organization's field. Still, all the way through we have services performed by the Government that I think could be charged for in such a way as to extend services to new people and new areas.

Mr. CROW. Since it has a bearing on your point, you may be interested in another piece of research, which we are doing. In all of this work we have to use somebody's plant as our laboratory because Government laboratories cannot be used to carry on this kind of research. In many cases, we get the particular firm where we are carrying on the work to furnish one or more men to augment our staff, and we get them to build at their own expense all the gadgets that we need. Therefore, we do augment our resources by getting help from these people.

Mr. ANDERSEN. I am not criticizing in any way your method of doing it; and this is not only in your particular division but all the way through Government.

Mr. WHITTEN. I would agree with the chairman on that. On the other hand, where your real problem frequently is to get folks to eliminate wasteful methods and to change and to do that which would benefit the consumer and the farmer, the minute you start charging for something they don't want anyway you increase the problem of getting advanced economical methods adopted.

Mr. ANDERSEN. That is true; no question about that.

Dr. SHAW. Some of this work we start stimulates other people to come in and do it on their own. Then we pull out.

Mr. CROW. We pull out as quickly as we can.

APPLE HANDLING

Another place where we have done work on cutting labor costs is in the apple-producing areas of the Pacific Northwest. One illustration of the results that have come out of this work is shown in this picture. The apples are ordinarily brought into the refrigerated warehouses where the boxes are stacked six high by the hand trucks as they come in, with laborers high piling or stacking the apples to a total height of 12 boxes. In our research to find ways to reduce the cost of handling apples, this machine, called a high-piler, was developed. One man can do the work of four with this high-piler and handle the apples with less jolting and damage, too. Incidentally, it only costs about $600, and it is powered by an automobile battery; so it is a simple piece of equipment.

The apple-handling work has shown that by using the right kind of handling equipment and methods in handling apples in the Pacific Northwest, it is possible to handle apples at a much lower cost than they are being handled by most warehousemen. For instance, the substitution of industrial clamp trucks for the belt conveyors and 2-wheel hand trucks that are used in about 50 percent of those warehouses, would save $42 per thousand boxes in handling costs. That is a 67-percent reduction.

Mr. ANDERSEN. There again, Mr. Crow, does not the apple industry or peach industry, or any industry, have people studying all possible improvements in the handling of all of those commodities?

GOVERNMENT DUPLICATION OF RESEARCH BY PRIVATE INDUSTRY

Mr. CROW. This work was done on contract with the Washington State Apple Commission which paid a part of the cost of doing it.

Mr. ANDERSEN. You are not duplicating work done now by private industry in these lines?

Mr. CROW. No. If we can find anybody who has done it and made the results available we leave it alone.

DISSEMINATION OF RESEARCH FINDINGS

Mr. ANDERSEN. You make sure that the results of your research are made available to people who can use it?

Mr. CROW. Yes, sir.

Mr. ANDERSEN. Research is worth nothing unless you get the results of it out to the people who can use it.

Mr. CROW. That is right.

There is widespread interest in the results of this work, and many groups are seeking answers to their handling problems. For instance, the Maine potato industry has long been interested in improving the efficiency of handling potatoes.

REDUCING THE COSTS OF RETAILING

Another field that I would like to mention to you, because as far as I know it has never been mentioned here before, is the field of retailing. About one-third of the marketing bill for food products is the cost of retailing. It is in the retail store that the consumer decides whether to take the product or leave it. Under the Agricultural Marketing Act, we have begun to get into the field of retailing on a very small scale scale. We are studying handling methods in retail stores to try to find ways to cut the cost of retailing. One thing we developed in this, using the same approach as in other handling studies, was a new checkout counter for use in grocery stores, which increased the productivity of the checker by 38 percent.

Mr. ANDERSEN. I think you gave us the information on that last year.

Mr. CROW. I did not appear before this committee last year, but you may have heard about it from some one else.

You may be interested to know that while we have made no effort to check up on the number of people who have bought these counters, we know that within the first 18 months more than 3,000 have been installed.

EMPHASIS OF RESEARCH TO BENEFIT PRODUCER

Mr. ANDERSEN. Dr. Shaw, are you in the Department of Agriculture perhaps forgetting about placing emphasis on research that will return dollars and cents directly to the farmer? Are you perhaps doing too much research that will benefit industry, including the retailer? All that we have heard this morning is relative to the terminals and retailers. This is very commendable but just where does that help the man on the farm get that additional improvement which might mean the difference between profit and loss?

Dr. TRELOGAN. Mr. Chairman, I would like to mention to you that we feel the Agricultural Marketing Act authorized and directed us to

do the work in the area of marketing. The cost and margins studies that we conducted have indicated to us pretty clearly where the costs are incurred and what services are performed. As Mr. Crow mentioned, the one thing we find almost invariably is that the widest margin is taken at the retail store. I refer to the retail store just as an illustration. As it looks to us, if we are going to do fruitful research in cutting down the costs that will enable these people to reduce their margins, you can't overlook the place where the largest margin is taken.

Mr. ANDERSEN. Absolutely correct, Doctor.

FARMER BENEFITS BY MARKETING EFFICIENCY

Mr. WHITTEN. Could I interject this: As great and as fine as our country is, most people and it doesn't make a lot of difference which walk of life they are in, spend about what they think they can afford for groceries. If you can cut down this cost between the farmer and the consumer who buys it in that store, it will result in the average consumer spending about as much money, but he will buy more groceries. I think reduced costs between producer and consumer opens up a tremendous possible market to American agriculture, as well as more and better food for the consumer. I think we are in this boat together.

Mr. ANDERSEN. I think you are absolutely correct. The only thing about which there is a doubt in my mind is—and it is also evidently in Mr. Horan's mind—whether we are keeping constantly in mind the producer down at the bottom end.

Dr. TRELOGAN. I want to assure you we are, sir.

Mr. ANDERSEN. That is fine. I want to impress that upon you each year when you come before us here.

Dr. SHAW. We would not engage in research where we thought the benefit was going to accrue solely to retailers.

Mr. ANDERSEN. I don't mind benefits accruing all along the line, but I want you to keep in mind that the Department of Agriculture is basically working for the farmer. If we can help other segments of the economy in so doing, fine.

Mr. WHITTEN. I saw a friend of mine a few weeks ago who had leased his grocery store because it took too much capital to operate. I believe he said it took $156,000 worth of equipment inside that small store to properly handle groceries if he was to meet competition on an economical basis.

RETAIL STORE STUDIES

Mr. CROW. That leads to one small study that has been of particular interest to the little retailer. We made a little study, quite an insignificant one, which I would not have mentioned if you had not brought up the small retailer. We found how retailers by better utilization of shelf space can handle more items in their space. This study shows that in most cases having only two rows of an item on a shelf will give the best results, and that sales in the canned goods department will increase only about 10 percent for each row added. That means that the little retailer with a little store and a little amount of shelf space can stock up a reasonable number of items and compete fairly well in varieties handled with larger stores. The little retailers have been particularly pleased with this study.

We made another study to find ways of reducing the cost of unloading groceries in retail stores, putting the prices on each individual item, and stocking the shelves. The improved methods developed increased the productivity of labor in the stores where they were introduced by 67 percent or more. When we finished this study we published a rather technical report setting forth the results. A national organization of supermarkets decided that they would take chapter by chapter the material in that report, popularize it, and distribute it. Here is their popular version of one chapter which they sent out to all their members asking if they would use more reports of this kind. I am informed that more than 90 percent of them replied that they wanted more reports of that kind, so they put out the second one, and it is their intent to issue more publications of material developed in our research. We are encouraging people all we can to reproduce our findings because it saves our money and gets the results put to use.

Mr. ANDERSEN. That is very commendable. I think that is the thing to do.

ECONOMIES IN MEAT RETAILING

Mr. CROW. The latest job we have done in the retailing field is trying to improve the efficiency of operation of the meat department. We have developed some new methods and some new gadgets there, and are issuing fine publications. You will be interested in knowing that in the first two meat departments where we introduced all of the new ideas developed, sales per man-hour were increased by roughly 100 percent. And whenever we develop these new gadgets, they are patented and made available for public use. This smear remover was developed under our meat-handling project. In meat stores every time a slice is sawed off, it is necessary to wipe the bone dust and smear off. It appeared that this was one of the places where we could reduce labor by making it unnecessary to wipe that meat slice off, so one of our employees invented the smear remover. It is fastened to the saw, and as the slice of meat comes through, it takes the smear off and the operator doesn't have to rub the slice at all. We also have a spinal-cord remover and meat-hook stabilizer that we developed. All inventions are patented for public use.

PATENT RIGHTS THROUGH GOVERNMENT RESEARCH

Mr. WHITTEN. This is an old story, Mr. Crow, and it has been in the record before, but frequently those who are not aware of it ask it again: Why should the Federal Government pay for all of this? For the record again, are all these patents and discoveries of the Department made available to the public, and all who are interested, under our law?

Mr. CROW. That is right. I might add this, that we didn't pay for making this smear remover and the other gadgets because this meat study was carried on in cooperation with two retail organizations, which have assisted us, and helped finance the work. These firms signed an agreement with us before we began working with them that anything that came out of the study would be made available for public use, and that they would not lay any claim to it because of its having been done in their store.

Mr. ANDERSEN. Please discuss the research you are conducting concerning the transportation of farm commodities.

TRANSPORTATION RESEARCH

Mr. CROW. In transportation our research work has much the same objectives as the work on markets and materials handling which I have discussed. We try to find ways to cut down the serious losses from damage and deterioration of food in transit which are especially important in the perishable field. For instance, the way containers are loaded in cars has a great deal to do with the transit damage that takes place.

SHIPPING OF CANTALOUPS

We are just completing a study on cantaloups, one of several commodities on which research has been done under contract with the Western Growers Association of Los Angeles, Calif. For many years the conventional method of loading cantaloups has been with the crates on their sides, lengthwise of the car. The cantaloup crate is not too solidly constructed and the side, top, and bottom slats are less than 2 inches wide. Losses in railroad shipment from container breakage alone have been averaging between $35 and $40 per car.

By experimenting with loading methods in a considerable number of test shipments it was found that by placing the containers on end in the car, rather than lengthwise, the container breakage could be reduced by about two-thirds and the bruising of melons in unbroken crates cut by a little less than one-half.

Incidentally, a method was developed for getting the cantaloup crates into the car for loading on end that will save both time and money. Not many shippers have adopted the on-end loading method up to the present time but one west coast grower shipped all of his loads that way last year and by using the improved method eliminated 1 of the 4 men he had used for loading. His three-man crew loaded cars in less time (45 minutes) than it took other shippers to load lengthwise cars using 4 and 5 men (50 minutes).

Our people also study the types of transportation equipment used for hauling agricultural products with the aim of obtaining greater efficiency and maintaining product quality at lower costs.

REFRIGERATION PROBLEMS

One of the serious problems of the frozen food industry has been to get transit temperatures low enough to protect the commodity from deterioration while it is being transported to distant markets. Much of the frozen food moves by truck and at the request of the frozen food industry we have done a considerable amount of work in that field. Our people ride with the truck being tested and through the use of electric resistance thermometers and thermocouples take frequent temperature readings, both air and commodity, at various positions in the trailer. Early in the program it was found that trucks using mechanical refrigeration had refrigerating units capable of delivering air at temperatures at 0° F. or below, but lack of provision for the adequate circulation of air around the load permitted commodity temperatures at some spots to rise to as much as 15 to 18 degrees. Our people developed a return air duct, which with adequate floor racks to permit the refrigerated air to circulate under the cargo, improved the situation substantially. One of the largest

processors of frozen citrus concentrate has adopted this method for his fleet, and commercial haulers of frozen foods are moving in the same direction.

Our men also have studied methods of the application of dry ice as a method of refrigeration. A year or so ago we ran tests on a dry ice unit that failed to give satisfactory performance. Our people thought the principle of the system was good but the unit did not have enough capacity, and so advised the manufacturer. He rebuilt the unit, increasing the capacity as suggested, and in subsequent tests we found that the improved system held product temperatures well within a safe range, approximately 4° below zero to 4° above.

In other directions our transportation research staff is working on means of improving livestock hauling equipment to cut down losses from dead and injured animals; on facilities used for the transportation of grain by rail and motortruck; and, is working with railroads in the endeavor to minimize terminal delays and speed up delivery time of cars transporting agricultural products. The purpose here is not only to reduce costs to shippers and receivers, but also, by getting better utilization of cars, the railroads can avoid, or at least minimize, the periodic shortages of cars that have been particularly troublesome since the end of World War II.

These are a few examples of the work being done under financial project 3 of the Agricultural Marketing Act. They are all designed to hold down the costs of marketing. All this work is done in cooperation with distributors with their facilities at the laboratory. I hope that these examples show that improvements in marketing facilities and handling methods can be made which will reduce costs, maintain quality, expand outlets for farm products, and supply more and better food to consumers.

Collection, Analysis, and Dissemination of Market Data

Mr. Andersen. I think you have given us a very fine discussion. Now, you are asking for an increase of $61,700 for the collection, analysis, and dissemination of market data. How does this work tie in to the work of the Bureau of Agricultural Economics funds, from regular funds?

Distribution of Marketing Act Funds to Departmental Agencies

Dr. Trelogan. Part of the work under this project is carried on by the Bureau of Agricultural Economics.

Mr. Andersen. In other words you transfer funds to them for that purpose, is that it?

Dr. Trelogan. All of the funds under this act are allotted to agencies that are best qualified and equipped to do the types of work that are undertaken. The collection and analysis and dissemination of statistics is done in the Bureau of Agricultural Economics because that is the agency in the Department of Agriculture that is responsible for that type of work.

They make sure everything they do under it is supplementary to and is over and above work provided for in any of their other authorizations. We undertake in the Bureau of Agricultural Economics the collection and the dissemination of those statistics and data not pro-

vided for elsewhere that are recommended by advisory committees and others and that are regarded as essential or highly needed.

Mr. ANDERSEN. On page 7 of your notes you indicate that the need for certain data has remained unsatisfied for several years. What is this data and what use would it serve?

STATISTICAL STUDIES ON PROCESS CHEESE

Dr. TRELOGAN. Let me use just a couple of illustrations. One illustration, recommended particularly at the present time, comes from the cheese industry where they have not had adequate statistics on the volume of process cheese. We have data on the production of cheese of various types, but we haven't had comparable statistics on the volume of process cheese; that is the amount of cheese used for processing or the amount of process cheese or cheese foods actually produced. The cheese industry has been pressing us for several years to make a series of data available for them on that.

Mr. ANDERSEN. If you did secure that, just what good would it do?

Dr. TRELOGAN. My understanding is that people in the cheese as well as related industries would use it just as they use other similar data to plan their operations, and to decide whether they should expand or contract production, hold or dispose of stocks, raise or lower prices. They also try to figure out whether they are improving or declining in competition with the others engaged in the same business. They use the data in innumerable ways in managing their operations and carrying out their functions in marketing.

Mr. WELLS. I would like to say the statistics we will collect under the Agricultural Marketing Act are those which relate to marketing, statistics for which we do not have funds under our regular crop estimates appropriation to handle. One of the requests which has been coming to our attention over the last 2 years have to do with monthly cheese statistics as Dr. Trelogan has stated. The dairy industry wants monthly statistics rather than annual statistics which come along sometime after the end of the calendar year. In other words, they want a current marketing guide.

STATISTICAL RESEARCH ON TURKEY PRODUCTION

Another group which is considerably worried and again would like current operating statistics, Mr. Chairman, are the turkey producers. We have urgent requests for some kind of service on the current production and probable rates of marketing, both for heavy turkeys and for broiler and light weight or Beltsville-type turkeys, something comparable to what we have been doing on broiler chicks where we have a weekly service financed under the Agricultural Marketing Act.

Mr. HUNTER. That would be helpful. Since turkey raisers have gotten into the production of this Beltsville turkey, it actually has thrown the statistics out of kilter. For example, it is announced that there are so many turkeys being grown in a certain period of time and people in the trade then multiply that number by an average weight without proper consideration of the Beltsville type, and they come to the conclusion that there are a lot more turkeys in terms of pounds than actually exist. This sort of thing has depressed the market unnecessarily.

Mr. WELLS. We have now and have had for quite a few years 2 or 3 turkey reports during the year that had to do with the number of turkeys. The people would like to see those broken down as between broilers, Beltsville light types and heavy types.

In addition the turkey people, especially those who are producing the lighter-weight turkeys, would like to see a weekly or monthly service because this industry moves pretty fast. They want something to guide them in current production and marketing plans. So most of these statistics go beyond basic statistics and get into market-flow types of data. Such statistics would be very useful. These requests actually all come to us or are reviewed through various advisory committees, Mr. Chairman.

NEED FOR MORE STATISTICIANS

Mr. ANDERSEN. Can't you secure this needed additional data without securing additional funds?

Mr. WELLS. No, I feel very strongly that any savings or additional economies we can effect within the regular crop and livestock estimates operation must now be devoted to improving the reliability and adequacies of the series we already have.

Mr. ANDERSEN. You feel it is going to need more statisticians along the line?

Mr. WELLS. I think they would be used to advantage, yes, sir.

Mr. HUNTER. Unless we get more statistical reliability, the data are not going to be accurate?

Mr. WELLS. We lack current marketing statistics; data on a weekly, monthly, or quarterly basis.

CONSUMER PREFERENCE AND TRADE-ACCEPTANCE STUDIES

Mr. ANDERSEN. Doctor, you also mentioned the need for further information on trade acceptance and consumer preference. I wish you would put in the record here examples of accomplishments in that field. You may extend your remarks if you wish.

Dr. TRELOGAN. That would be fine.

(The material requested is as follows:)

BUREAU OF AGRICULTURAL ECONOMICS

SOME RECENT ACCOMPLISHMENTS IN CONSUMER PREFERENCE AND ACCEPTANCE RESEARCH UNDER THE AGRICULTURAL MARKETING ACT, FINANCIAL PROJECT IV, COLLECTION, ANALYSIS, AND DISSEMINATION OF MARKET DATA.

Commodities which have been or are being studied include potatoes, rice, citrus fruits and juices, apples, and winter pears, cooking fats and oils, apple juice, cranberries, constituents of white bread, and cotton and wool products. A few of the more recent studies have been:

1. *Men's preferences among wool suits, coats, and jackets, Agriculture Information Bulletin No. 64.*—The Men's Clothing Manufacturers Association of the United States called this "the most * * * valuable study ever made" from the standpoint of their industry. It was highly commended by the Wool Bureau, Inc., National Retail Clothiers Association, Montana wool laboratory, department of wool technology of the University of Wyoming and many other trade groups, college departments, and research agencies concerned with wool and wool textiles. The results of this study have been widely used by wool manufacturers and others in national advertising campaigns to call attention to the advantages of wool clothing.

2. *Automobile manufacturers discuss fabrics and fibers for passengers car, Agriculture Information Bulletin No. 45.*—This study was based on interviews with all top executives of the automobile manufacturing companies, and dealt with cotton, wool, and competitive fibers used in fabrics for the interior of passenger cars. It was very well received by the Wool Bureau, Inc., the National Cotton Council, National Federation of Textiles, Inc., various large textile mills specializing in wool and cotton fabrics for the automobile industry and by the automobile manufacturers themselves. The National Cotton Council called the study "excellent, packed with information of the type our industry needs in its evaluation of cotton's competitive position by major market outlets."

3. *Survey of canvas awning fabricators, Marketing Research Report No. 1.*—This survey of the awning-fabricating industry received much complimentary comment. The National Canvas Goods Manufacturers Association wrote, "The thoroughness and detail of this study will be of tremendous value both to this organization and its members as well as to the entire canvas goods industry." The National Cotton Council said, "It is a fine job of compiling such essential information about one of cotton's major industrial markets. We are already using the information as a guide in planning and carrying out our industry's programs of research and sales program to strengthen cotton's position in this market."

4. *Consumers use of and opinions about citrus products, Agriculture Information Bulletin No. 50; ability to discriminate and preferences in regard to canned orange juices that vary in brix and brix-acid ratio; and, discrimination tests and preliminary preference ratings of frozen concentrates for lemonade.*—The national study (No. 50) and the other discrimination studies have received enthusiastic support from the citrus industry which has also given substantial financial cooperation. Various citrus trade associations and cooperatives bought hundreds of copies of the report for distribution to their members. The California Fruit Growers Exchange called the national study "one of the best bulletins we have ever seen relating to the use of and opinions about a commodity by consumers." Real Gold Citrus Products said, "it is one of the finest studies on citrus products it has ever been our pleasure to read." Similar comments came to the Department from all segments of the citrus industry in all the citrus-producing States.

WORK UNDER CONTRACTS

Mr. ANDERSEN. How much of your work for 1953 did you handle under contracts?

Dr. TRELOGAN. The 1953 program calls for a minimum of $600,000 of contracts. Heretofore we have always regarded the amount designated as a minimum and we have tried to exceed the amount that you have designated in the appropriaton bill for contracts. I will just say that in this year we are not sure yet where we come out.

Mr. ANDERSEN. Naturally you are not. We are a little better than half way through.

Dr. TRELOGAN. I am more than usually apprehensive this year about whether we are going to reach our minimum by virtue of adjustments we have had to make to try to handle several pressing special problems.

Mr. ANDERSEN. How much do you propose contracting in 1954 fiscal year?

Dr. TRELOGAN. The same amount, sir, and again we would regard it as the minimum and do our best to exceed it.

Mr. ANDERSEN. Give us some examples here of some work under major contracts.

Dr. TRELOGAN. This presents a problem of selection. We have quite a number of contracts.

Mr. ANDERSEN. Discuss one specific example.

Dr. TRELOGAN. All right, sir. For the specific example, I can draw on the remarks made earlier in the testimony regarding the work done with the Washington State Apple Commission, in which the contract

was let with that agency to develop methods and procedures to improve the handling of apples in the packinghouses. I think that the pictures that were shown earlier and the description that was given by Mr. Crow illustrate the type of work that is coming out of that contract. We are also assured by contracting with such an agency that the packinghouses in the area are in touch with the research and are adopting the results as quickly as they become available. That is one of the advantages of this type of contract. To tell you the truth, one of the real pressures comes from their desire to get the results issued so quickly that at times we have been criticized for delaying their issuance until we are satisfied that the results are reliable.

Mr. ANDERSEN. You might be a little more specific about that, if you wish, for the record.

Dr. TRELOGAN. Fine.

(The material requested is as follows:)

1. APPLE HANDLING RESEARCH CONTRACT

A research contract was entered into with the research department of the Washington State Apple Commission to determine the relative costs of moving apples in boxes into and out of apple packing and storage houses by the methods and equipment now employed and by improved methods and equipment developed as a result of the research. The studies were made in 17 houses in the Yakima, Wenatchee, Okanogan, and Oroville districts of Washington.

Standard time values for handling apples in boxes were developed for seven cycles of operations which start at the loading of the motortruck at the orchard, and end after the fruit has moved through the storage and packing house and is loaded on motortrucks or railroad cars for movement to market. These values were developed for a total of 11 different types or combinations of types of materials-handling equipment. Data on the costs of ownership and operations of different types of materials-handling equipment were also developed, and together with labor costs can be used in computing the comparative costs for performing handling operations with different methods and types of equipment, under certain specified conditions, and in a given facility. In addition to the equipment currently in use in apple packing and storage houses 10 new types or combinations of types of materials-handling equipment were tested to determine their possibilities for increasing the efficiency of applicable handling operations.

The results of this study indicate that by using industrial clamp trucks instead of the usual belt conveyor and two wheel hand trucks, a saving could be made of $42 per thousand boxes handled and stacked 12 high. If all the apple-packing houses in Washington were to use the most efficient methods of handling developed in this study, it is estimated that the saving in cost would be $300,000 per year for this part of the packinghouse cost. In addition to the reduction in cost of handling, adoption of the new system would release approximately 700 people who could be used in harvesting or other orchard work.

During the course of the work a portable mechanical lift for high piling and breaking out high-piled boxes of apples was developed and tested. Tests showed that with the use of this machine the cost of piling 12 high could be reduced 65 percent or $8.34 per 1,000 boxes. As an indication of the value attached to this machine, it should be noted that 100 have been manufactured and are now in use.

2. FLUID MILK QUALITY CONTRACT

The effects of various sanitary regulations, promulgated by local market authorities, on the quality of fluid milk were studied under contract with the National Academy of Sciences, National Research Council. In this work it was found that although there were variations in quality of fluid milk marketed in eight different cities, the supply in all of them was satisfactory from a health standpoint. The greatest difficulties with milk quality occurred in those cities in which (1) adequate facilities for washing utensils on farms were not required, (2) the temperature of the milk received from farms was above 50° F., and (3) fewest samples were tested for bacterial count and fewest farms visited by sanitarians and fieldmen.

It was also found that if the essentials of sanitation are followed satisfactory milk can be produced without following all of the details of present regulations. Some of these appear in rules that specify in detail the distance between milkhouses and barns, the size and kinds of walkways, the exact dimensions of milkhouses and barns, the exact means of cooling, and a single procedure for sanitizing utensils. Although such detailed requirements were not generally necessary to obtain wholesome milk some of them might well be recommended on a voluntary basis to solve problems in specific areas or at specific milk plants where sanitation troubles develop. A printed report giving the results of the study will be available in the near future.

3. FRUIT CONSUMER PURCHASES CONTRACT

The Bureau of Agricultural Economics has maintained a service contract since October 1949 with a private marketing research organization to provide information on consumer purchases of citrus fruits and products and dried fruits. From the data supplied, the Bureau publishes monthly consumer purchase volume of these items, average prices paid, percent of families buying, and average size of purchase. Quarterly publications present the same information by region and type of retail store through which the purchases were made. An annual summary presents the purchase data by family characteristics such as income, education, and occupation of the head of the household making the purchase. Half of the funds for this contract are provided by contributions from participating fruit-industry groups and one-half from the Agricultural Marketing Act funds.

A survey of the use of these data last summer not only indicated wide use in the participating industries in making day-to-day marketing decisions, but also throughout the whole field of organizations servicing the industry and assisting them in getting their products to market, such as the wholesale and retail trade, financial interests, railroads, and can suppliers. The data obtained from this contract are also being used as the basis for research into the characteristics of demand for the products covered. At its meeting a year ago, the Citrus Fruit Advisory Committee gave a first priority rating to the continuation of this service under contract.

4. FROZEN APPLE JUICE CONTRACT

In December 1950 the Bureau of Agricultural Economics conducted a series of studies with the Western Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry and the apple industry of the Pacific Northwest. These studies were designed to determine consumer acceptance of a new frozen concentrated apply juice manufactured by a process developed by the Western Regional Research Laboratory. The studies were designed to find out whether consumers would purchase the apple juice in sufficient quantities to make commercial production feasible. The juice was placed in commercial trade in two test markets. After it had been in the market for some time a sample of housewives were asked whether they had purchased the product and what they thought of it. The interviewing of these housewives and tabulation of the data were contracted to a private marketing-research organization. The analysis of the data was done by the Bureau of Agricultural Economics. As a result of these studies a large juice concern has undertaken commercial manufacture and the product was distributed in a limited area last season.

ADVISORY COMMITTEES

Mr. ANDERSEN. To what extent have proposed projects been reviewed and approved by your advisory committees?

Dr. TRELOGAN. On this topic, I gave a report last year and I have forgotten the data but I would say that more than 90 percent of our projects are annually reviewed by and have the direct approval and recommendation of advisory committees.

We indicated to you last year that there were certain areas of our work where we did not have established advisory committees. Three new committees have been established during the past year. They

are production economics; soils, water and fertilizer; and forest research. We are also endeavoring to get more coverage by calling the attention of existing advisory committees to these other areas of work. That is a slow process, I think, but we are endeavoring to do it. To the extent that we can, we hope to establish an additional advisory committee for areas that are not now covered so that we will get more complete consideration of our whole program.

Mr. ANDERSEN. I would like you to supply for the record a list of the present membership of all the advisory committees having to do with general research in the Department.

Also, discuss the method of reviewing the programs by these committees and explain under what broad policies and directives do they operate.

Dr. TRELOGAN. Yes, sir.

Mr. ANDERSEN. If you will do that when you assemble this other information for the record, it will be appreciated.

(The material requested is as follows:)

The Agricultural Research Policy Committee was established pursuant to section 301, title III, of the Research and Marketing Act. The functions of this committee are established by law as:

"In order to aid in implementing the research and service work authorized under titles I and II of this Act, and to assist in obtaining the fullest cooperation among Federal and State agencies, producers, farm organizations, and private industry, in the development of and in effectuating such research and service programs, and in order to secure the greatest benefit from the expenditure of funds, the Secretary of Agriculture shall establish a national advisory committee. The functions of such advisory committee shall be to consult with the Secretary of Agriculture and other appropriate officials of the Department of Agriculture, to make recommendations relative to research and service work authorized by the Act, and to assist in obtaining the cooperation of producers, farm organizations, industry groups, and Federal and State agencies in the furtherance of such research and service programs."

The Agricultural Research Policy Committee meets quarterly as required by law. The last four meetings were held May 22–23, 1952, August 11, 1952, November 20–21, 1952, and February 19–20, 1953. The current membership of the Committee is:

John D. Black, professor of agricultural economics, Harvard University, Cambridge, Mass.
A. A. Brock, director, California Department of Agriculture, Sacramento, Calif.
Homer L. Brinkley, executive vice president, National Council of Farmer Cooperatives, Washington, D. C.
C. G. King, scientific director, the Nutrition Foundation, Inc., New York, N. Y.
Herschel D. Newsom, master, the National Grange, Washington, D. C.
James G. Patton, president, National Farmers Union, Denver, Colo.
Harry J. Reed, dean and director, School of Agriculture, Purdue University, Lafayette, Ind.
Mrs. Raymond Sayre, past president, the Associated Women of the American Farm Bureau Federation, Ackworth, Iowa.
Dean Stanley, president, Stanley Fruit Co., Phoenix, Ariz.
H. Vandiver, general manager, Mid-South Cotton Growers Association, Memphis, Tenn.

Commodity, functional, and State agency advisory committees have been established as authorized in section 302, title III, of the Research and Marketing Act.

"SEC. 302. In the furtherance of the research and service work authorized by this Act, the Secretary of Agriculture may, in addition to the National Advisory Committee, establish appropriate committees, including representatives of producers, industry, government, and science, to assist in effectuating specific research and service programs."

With the assistance of the chairman of these committees, who have met as a group on June 20–22, 1950, September 17–19, 1951, and November 18–20, 1952, the following instructions were developed and are given to committee members regarding their functions:

"The committees have been asked to consider all of the research and marketing service work of the Department in their respective fields. This is in recognition of the value the Department places upon the advice and counsel received and is in accord with suggestions of congressional committee members who are directly concerned with the work.

"These committees are performing an important function in advising with respect to the development of the Department's research and marketing service programs. However, it is recognized by members of Congress, committee members, and the Department that the implementing and administering of these programs are the responsibility of the Department.

"The functions of the advisory committeemen include:

"1. Acquainting themselves with the problems of producers, all segments of the industry and of other groups, and presenting them for committee consideration.

"2. Reviewing and evaluating the current research and marketing service programs of the Department, including work under way at Federal laboratories and field stations.

"3. Recommending adjustments in the Department's program, including priorities for new work and expansion of work under way.

"4. Developing a better understanding of the nature and value of the agricultural research program, explaining it to interested persons, groups, and organizations and encouraging the wider and more rapid application of the findings of research."

The committees and the current membership of each is as follows:

CITRUS FRUIT

N. L. Allen, president, American National Co-operative Exchange, Inc., New York, N. Y.
Stanley B. Crockett, Harlingen, Tex.
L. S. Hamme, manager, Texsun Citrus Exchange, Weslaco, Tex.
J. J. Parrish, Jr., president, Nevins Fruit Co., Inc., Titusville, Fla.
Raymond D. Robinson, vice president, Dr. P. Phillips Co., Orlando, Fla.
Charles A. Rogers, Weslaco, Tex.
Robbins Russel, general manager, Mutual Orange Distributors, Redlands, Calif.
A. V. Saurman, secretary-manager, Pinellas Growers Association, Clearwater, Fla.
Virgil H. Tyler, manager, Ventura Coastal Lemon Co., Ventura, Calif.
F. R. Wilcox, assistant general manager, Sunkist Growers, Inc., Los Angeles, Calif.

COLD STORAGE

Paul B. Christensen, North East Cold Storage Corp., Portland, Maine
A. R. Current, City Products Corp., Chicago, Ill.
H. C. Diehl, director, The Refrigeration Research Foundation, Colorado Springs, Colo.
Arnold T. Hampson, treasurer, Merchants Cold Storage & Warehouse Co., Providence, R. I.
Walter F. Henningsen, Sr., president, Northwestern Ice & Cold Storage Co., Portland, Oreg.
Harold J. Humphrey, research manager, Birds Eye Division, General Foods Corp., New York, N. Y.
C. A. Martin, Sr., president, Polar Cold Storage, Inc., Nashville, Tenn.
Harlan J. Nissen, Terminal Refrigerating Co., Los Angeles, Calif.
R. G. Purnell, president, Quick Frozen Foods, Inc., Tupelo, Miss.
S. C. Rogers, G. H. Hammond Co., Chicago, Ill.
Len B. Wooton, manager, Ninth Street Skookum Growers, Inc., Wenatchee, Wash.

COTTON AND COTTONSEED

Harry S. Baker, president, Producers Cotton Oil Co., Fresno, Calif.
Harry Caldwell, master, the North Carolina State Grange, Greensboro, N. C.
Roy Davis, manager, Plains Cooperative Gins, Inc., Lubbock, Tex.

A. L. Durand, president, Chickasha Cotton Oil Co., Hobart, Okla.
T. H. Gregory, executive vice president, National Cottonseed Products Association; Memphis, Tenn.
M. Earl Heard, vice president in charge of research, West Point Manufacturing Co., Shawmut, Ala.
Burris C. Jackson, Jackson & Co., Hillsboro, Tex.
Robert C. Jackson, executive vice president, American Cotton Manufacturers Institute, Inc., Washington, D. C.
J. Russell Kennedy, general manager, California Cotton Cooperative Association, Bakersfield, Calif.
Aubrey L. Lockett, president, Lockett Seed Co., Vernon, Tex.
H. F. Ohlendorf, Ohlendorf Farms, Osceola, Ark.
Dr. Charles R. Sayre, president, Delta & Pine Land Co., Scott, Miss.
Elwood H. Smith, Casa Grande, Ariz.
John H. Todd, Washington representative, National Cotton Compress & Cotton Warehouse Association, Washington, D. C.
H. L. Wingate, president, Georgia Farm Bureau Federation, Macon, Ga.

DAIRY

Arnie Agnew, Milton Junction, Wis.
L. F. Friend, secretary-manager, Mid-South Milk Producers Association, Memphis, Tenn.
E. W. Gaumnitz, Executive secretary, National Cheese Institute, Inc., Chicago, Ill.
Ken E. Geyer, general manager, Connecticut Milk Producers Association, Hartford, Conn.
P. L. Haymes, United Milk Products Co., Cleveland, Ohio.
D. K. Howe, president, Fairmont Foods Co., Omaha, Nebr.
Clarence B. Palmer, Palmer Farms, Ethlyn, Mo.
Dr. Paul F. Sharp, director, Agricultural Experiment Station, University of of California, Berkeley, Calif.
Dr. T. G. Stitts, H. P. Hood & Sons, Inc., Boston, Mass.
Eugene L. Turner, Anniston, Ala.
Russell Waltz, president, Consolidated Dairy Products Co., Seattle, Wash.

DECIDUOUS FRUIT AND TREE NUTS

William Applebaum, assistant general manager, Stop & Shop, Inc., Boston, Mass.
A. W. Christie, field manager, California Walnut Growers Association, Los Angeles, Calif.
Dr. J. Harold Clarke, Cranguyma Farms, Long Beach, Wash.
Elon J. Gilbert, Richey & Gilbert Co., Yakima, Wash.
M. E. Knouse, Knouse Foods Cooporative, Inc., Peach Glen, Pa.
Grant Merrill, the Grant Merrill Orchards, Red Bluff, Calif.
Henry W. Miller, Jr., vice president, Consolidated Orchard Co., Paw Paw, W. Va.
J. B. Miller, Jr., Miller Pecan Products, Albany, Ga.
Walter A. Reich, A. Reich & Sons, Inc., Kansas City, Mo.
A. J. Rogers, general manager, Cherry Growers, Inc., Traverse City, Mich.
Dr. Alfred G. Smith, Lexington, S. C.
A. E. Thorpe, secretary, Dried Fruit Association of California, San Francisco, Calif.
Roy A. Ward, chairman, Oregon Filbert Commission, Portland, Oreg.

DRY BEANS AND PEAS

Arthur L. Andersen, Ault, Colo.
E. O. Crawford, Michigan Bean Shippers Association, Breckenridge, Mich.
Robert L. Kelley, Chester B. Brown Co., Morrill, Nebr.
S. Atwood McKeehan, Meridan, Calif.
Harold J. Roffler, E. L. McDonnell & Co., Spokane, Wash.
James H. Shields, Jr., Shields, Buhl, Idaho.
Arthur Shoultes, Bentley, Mich.
Howard L. Sprague, Hall, N. Y.
William A. Wolf, Latah, Wash.

FEED

H. M. Blackhurst, assistant general manager, Utah Poultry & Farmers Co-op, Salt Lake City, Utah.
L. E. Bopst, secretary-treasurer, Association of American Feed Control Officials, College Park, Md.
Elwood L. Chase, Cooperative G. L. F. Exchange, Inc., Buffalo, N. Y.
E. G. Cherbonnier, St. Louis, Mo.
Robert G. Jeffrey, Childress-Jeffrey, Wagoner, Okla.
Fred J. Ludwig, director, Farmers Trading Co., Laurens, Iowa.
W. Hugh McGee, Starr, S. C.
Walter W. McLaughlin, manager, Farm Service Department, The Citizens National Bank, Decatur, Ill.
Harold L. Peet, Pike, N. Y.
Dr. Paul H. Phillips, Department of Biochemistry, College of Agriculture, University of Wisconsin, Madison, Wis.
R. C. Woodworth, vice president, Cargill, Inc., Minneapolis, Minn.

FOOD AND NUTRITION

Dr. M. K. Bennett, executive director, Food Research Institute, Stanford University, Stanford, Calif.
Dr. Laurence V. Burton, executive director, Packaging Institute, Inc., New York, N. Y.
Dr. Grace A. Goldsmith, school of medicine, Tulane University of Louisiana, New Orleans, La.
Mrs. Ethel Austin Martin, consultant in nutrition, National Dairy Council, Chicago, Ill.
Dr. L. A. Maynard, director, school of nutrition, Cornell University, Ithaca, N. Y.
Mrs. J. C. Merrill, Trenton, N. J.
Dr. Day Monroe, Topeka, Kans.
Dr. Herbert E. Robinson, Director of Laboratories, Swift & Co., Chicago, Ill.
Dr. Pearl Swanson, assistant director and professor in charge of home economics research, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.
Dr. E. Neige Todhunter, head, department of food and nutrition, School of Home Economics, University of Alabama, University, Ala.
Dr. James R. Wilson, secretary, council on foods and nutrition of the American Medical Association, Chicago, Ill.

FOREIGN AGRICULTURAL TRADE POLICY

E. F. Creekmore, E. F. Creekmore & Co., Inc., New Orleans, La.
E. W. J. Hearty, Hearty & Loos, New York, N. Y.
J. R. Jarboe, Tulsa, Okla.
Dr. O. B. Jesness, Chief, Division of Agricultural Economics, University of Minnesota, St. Paul, Minn.
Robert F. Loree, chairman of board, National Foreign Trade Council, Inc., New York, N. Y.
Dr. W. I. Myers, dean, College of Agriculture, Cornell University, Ithaca, N. Y.
Edward J. O'Brien, Jr., Edward J. O'Brien & Co., Louisville, Ky.
James G. Patton, president, National Farmers Union, Washington, D. C.
J. T. Sanders, legislative counsel, the National Grange, Washington, D. C.
Paul D. Sanders, The Southern Planter, Richmond, Va.
W. A. Schoenfeld, Corvallis, Oreg.
Samuel Slotkin, chairman of the board, Hygrade Food Products Corp., Newark, N. J.
Jesse W. Tapp, executive vice president, Bank of America, San Francisco,Calif.

FOREST RESEARCH

Gus P. Backman, secretary, chamber of commerce, Salt Lake City, Utah
T. E. Bercaw, chief, forest management section, Gaylord Container Corp., Bogalusa, La.
S. T. Dana, professor of forestry, School of Natural Resources, University of Michigan, Ann Arbor, Mich.
Seth Gordon, director, department of fish and game, State of California, San Francisco, Calif.

C. C. Heritage, director of development, Weyerhaeuser Timber Co., Tacoma, Wash.
Harley Langdale, Jr., The Langdale Co., Valdosta, Ga.
Russell Lord, editor, The Land, Bel Air, Md.
S. M. Nickey, Jr., Nickey Bros., Inc., Memphis, Tenn.
Roscoe C. Rich, Burley, Idaho
Clay H. Stackhouse, national vice president, the National Association of Soil Conservation Districts, Wakeman, Ohio
C. V. Youngquist, chief, division of water, department of natural resources, Columbus, Ohio

GRAIN

Herbert W. Clutter, Holcomb, Kans.
Henry L. Cox, vice president, Corn Products Refining Co., Argo, Ill.
Gordon Day, Onida, S. Dak.
Lewis G. Graeves, president-general manager, the Charles Schneider Baking Co., Washington, D. C.
M. D. Guild, manager, Indiana Grain Cooperative, Indianapolis, Ind.
Roy F. Hendrickson, Washington representative, National Federation of Grain Co-ops, Washington, D. C.
C. Edgar Leafdale, Mesa, Ariz.
Don A. Stevens, vice president, General Mills, Inc., Minneapolis, Minn.
Robert B. Taylor, Adams, Oreg.
Frank A. Theis, president, Simonds-Shields-Theis Grain Co., Kansas City, Mo.
John B. Wilson, Jr., Bowling Green, Ohio.

LIVESTOCK

Charles Bauer, the National Association of Retail Meat and Food Dealers, Inc., Cincinnati, Ohio
Frank S. Boice, Empire Ranch, Sonoita, Ariz.
Harry B. Coffee, president, Union Stock Yards Co. of Omaha, Omaha, Nebr.
Joe B. Finley, Callaghan Ranch, Encinal, Tex.
Eugene P. Forrestel, Akron, N. Y.
Wesley Hardenbergh, president, American Meat Institute, Chicago, Ill.
Dr. George H. Hart, head, division of veterinary medicine, College of Agriculture, University of California, Davis, Calif.
Henry Kruse, president, Seattle Packing Co., Seattle, Wash.
J. E. Wells, Jr., executive vice president, Farmers Union Livestock Association, South St. Paul, Minn.
P. E. Williams, Crescent Valley Ranch, Davenport, Fla.
G. N. Winder, Craig, Colo.

OILSEEDS AND PEANUT

Otto Brandau, Rudd, Iowa
John H. Bryson, president, Dothan Oil Mill Co., Dothan, Ala.
Harry J. Deuel, Jr., University of Southern California, dean of the Graduate School, Los Angeles, Calif.
J. B. Edmondson, Danville, Ind.
T. H. Gregory, executive vice president, National Cottonseed Products Association, Memphis, Tenn.
C. L. Halladay, assistant manager, Derby Foods, Inc., Chicago, Ill.
Howard Kellogg, Jr., president, Spencer Kellogg & Sons, Inc., Buffalo, N. Y.
Lloyd Mehlhouse, Olivia, Minn.
A. D. Richardson, Floresville, Tex.
Charles B. Shuman, president, Illinois Agricultural Association, Chicago, Ill.
S. E. Statham, Cobb, Ga.
V. Wurtele, president, Minnesota Paints, Inc., Minneapolis, Minn.
Obed A. Wyum, Rutland, N. Dak.
Edward J. Young, Stevens Industries, Inc., Dawson, Ga.

POTATO

Edward H. Anderson, Edward H. Anderson & Co., Chicago, Ill.
Claude E. Botkin, Claude Botkin Farms, Arvin, Calif.
J. Abney Cox, H. L. Cox & Sons, Princeton, Fla.
Harold J. Evans, secretary-treasurer, New York Cooperative Seed Potato Association, Inc., Georgetown, N. Y.

Ole A. Flaat, Grand Forks, N. Dak.
Frank W. Hussey, president, Maine Potato Growers, Inc., Presque Isle, Maine.
Dr. James E. Kraus, associate director, Agricultural Experiment Station, University of Idaho, Moscow, Idaho.
Frederick J. Meyer, president, Red Dot Foods, Inc., Madison, Wis.
George L. Moore, First National Stores, Inc., Somerville, Mass.
Frank J. Towles, Meggett, S. C.
L. E. Waters, general manager, Colorado Potato Growers Exchange, Denver, Colo.

POULTRY

Andrew Christie, Christie Poultry Farms, Inc., Kingston, N. H.
W. Andrew Cray, Stockton, N. J.
R. F. Frazier, executive secretary, Southeastern Poultry and Egg Association, Richmond, Va.
Leland J. Graham, general manager, Southern States Marketing Cooperative, Baltimore, Md.
Richard Hanson, J. A. Hanson & Son, Corvallis, Oreg.
Victor W. Henningsen, Henningsen Bros., New York, N. Y.
Ralph E. Janes, Janes Bar Nothing Ranch, Austin, Tex.
Edward W. Priebe, Jr., merchandising director, Institute of American Poultry Industries, Chicago, Ill.
H. E. Slusher, president, Missouri Farm Bureau Federation, Jefferson City, Mo.
L. N. Thompson, manager, egg department, Poultry Producers of Central California, San Francisco, Calif.
Dr. Charles W. Upp, head, Poultry Industry Department, Louisiana State University, Baton Rouge, La.

PRODUCTION ECONOMICS

Joseph Ackerman, associate managing director, Farm Foundation, Chicago, Ill.
Ernest R. Ahrendes, Highwood, Mont.
James C. Hand, Jr., president, Delta Implement Co. Stores, Rolling Fork, Miss.
Dr. H. B. James, head, Department of Agricultural Economics, North Carolina State College of Agriculture and Engineering, Raleigh, N. C.
Dr. Leonard F. Miller, professor, Farm Management School of Agriculture, Pennsylvania State College, State College, Pa.
W. E. Morgan, president, Colorado Agricultural and Mechanical College, Fort Collins, Colo.
Clarence D. Palmby, Garden City, Minn.
Dr. Raymond J. Penn, chairman, Department of Agricultural Economics, College of Agriculture, University of Wisconsin, Madison, Wis.
Albert A. Thornbrough, vice president and director of procurement, Harry Ferguson, Inc., Detroit, Mich.

RICE

E. V. Boyt, manager, Devers Canal Co., Devers, Tex.
L. C. Carter, general manager, Arkansas Rice-Growers Cooperative Association, Stuttgart, Ark.
Harry Chalkley, Jr., Lake Charles, La.
Harry M. Creech, chairman, California Rice Exporters, San Francisco, Calif.
Glen R. Harris, Richvale, Calif.
Marshall E. Lehy, executive vice president, Farmers' Rice Growers Cooperative, San Francisco, Calif.
R. D. Lewis, director, Texas Agricultural Experiment Station, College Station, Tex.
William M. Reid, president, Rice Millers' Association, New Orleans, La.
Joseph W. Welsh, Charleston, S. C.

SEED

Lloyd M. Brown, president, Albert Dickinson Co., Chicago, Ill.
Merritt Clark, vice president and general manager of sales, Associated Seed Growers, Inc., New Haven, Conn.
Roy A. Edwards, president Rudy-Patrick Seed Co., Kansas City, Mo.
Harrison Evans, manager, E. F. Nunn & Co., Shuqualak, Miss.
Sam Frantz, Amlin, Ohio

Ralph D. Henson, Eastern States Farmers Exchange, Inc., milling division, Buffalo, N. Y.
Dr. D. D. Hill, head, farm crops department, Agricultural Experiment Station, Oregon State College, Corvallis, Oreg.
Dale H. Johnston, Johnston Seed Co., Enid, Okla.
R. A. Krantz, Yaggy Plantation, Hutchinson, Kans.
Maurice A. Perry, Hemet, Calif.
John D. Remsberg, Jr., Rupert, Idaho

SOILS, WATER, AND FERTILIZERS

Dr. Richard Bradfield, head, department of agronomy, Agricultural Experiment Station, Cornell University, Ithaca, N. Y.
Russell Coleman, president, National Fertilizer Association, Washington, D. C.
Dr. R. W. Cummings, drector of research, School of Agriculture, North Carolina State College of Agriculture and Engineering, Raleigh, N. C.
W. Lewis David, Corsicana, Tex.
E. M. Dwyer, Weymouth, Mass.
W. W. Horner, Horner & Shifrin, St. Louis, Mo.
Lester F. King, Helix, Oreg.
Dr. D. F. Peterson, Jr., head, department of civil engineering, Colorado Agricultural and Mechanical College, Fort Colling, Colo.
Dr. J. B. Peterson, head, department of agronomy, Agricultural Experiment Station, Purdue University, La Fayette, Ind.
Jame J. Wallace, farm manager, Iowa State College Agricultural Foundation, Ames, Iowa

SUGAR

J. M. Brown, chief chemist, Revere Sugar Refinery, Charlestown, Mass.
Harry Clark, director, National Beet Growers Federation, Greeley, Colo.
R. H. Cottrell, vice president, Amalgamated Sugar Co., Ogden, Utah.
Ernest W. Greene, vice president, Hawaiian Sugar Planters' Association, Washington, D. C.
Gordon Lyons, executive manager, California Beet Growers Association, Ltd., Stockton, Calif.
William C. Prewitt, vice president (agriculture), United States Sugar Corp., Clewiston, Fla.
Perc A. Reeve, agricultural supervisor, Farmers & Manufacturers Beet Sugar Association, Saginaw, Mich.
Dudley Smith, vice president, Association of Sugar Producers of Puerto Rico, Washington, D. C.
Marcel J. Voorhies, vice president and general manager, American Sugarcane League, New Orleans, La.

TOBACCO

Robert C. Austin, vice president, Austin Co., Inc., Greeneville, Tenn.
William S. Fuller, president, Griffin-Fuller Tobacco Co., East Windsor Hills, Conn.
Charles E. Gage, Falls Church, Va.
B. A. Graham, Olanta, S. C.
Tom J. Hitch, president, Tennessee Farm Bureau Federation, Columbia, Tenn.
Charles H. Horn, vice president, Federal Cigar Co., Inc., Red Lion, Pa.
John W. Jones, president, Burley Tobacco Growers Cooperative Association, Lexington, Ky.
Joseph Kolodny, managing director, National Association of Tobacco Distributors, Inc., New York, N. Y.
Daniel M. Pierce, Edgerton, Wis.
R. Flake Shaw, executive vice president, North Carolina Farm Bureau Federation, Greensboro, N. C.

TRANSPORTATION

E. J. Barry, Farmers Union Grain Terminal Association, St. Paul, Minn.
G. W. Baxter, director, transportation department, Illinois Agricultural Association, Chicago, Ill.
Justus F. Craemer, commissioner, California Public Utilities Commission, San Francisco, Calif.
Ralph L. Dewey, assistant dean and professor of economics, Graduate School, Ohio State University, Columbus, Ohio.
C. B. FunderBurk, treasurer, Cotton Producers Association, Atlanta, Ga.

Charles F. Hawes, traffic manager, Dairymen's League Cooperative Association, Inc., New York, N. Y.
Earl D. Mallison, manager, research and development, Atlantic Commission Co., New York, N. Y.
R. C. Neill, traffic manager, Sunkist Growers, Inc., Los Angeles, Calif.
Lee J. Quasey, commerce counsel, National Livestock Producers Association, Chicago, Ill.
Gordon Stedman, secretary-manager, Growers & Shippers League of Florida, Orlando, Fla.
F. O. Terrill, general manager, warehousing and transportation, Kroger Co., Cincinnati, Ohio.

VEGETABLE

Morton Adams, Alton Canning Co., Inc., Alton, N. Y.
Mrs. Katharine M. Alderman, St. Paul, Minn.
Harold M. Buzek, proprietor, Flatow, Riley & Co., Cincinnati, Ohio
Dr. Roger B. Corbett, agricultural counsel, National Association of Food Chains, Washington, D. C.
J. F. Dezauche, Dezauche & Son, Inc., Opelousas, La.
Paul B. Dickman, Paul B. Dickman Farms, Ruskin, Fla.
Kenneth R. Nutting, K. R. Nutting Co., Salinas, Calif.
Joseph W. Robson, Robson Seed Farms, Hall, N. Y.
O. E. Snider, general manager, Blue Lake Packers, Inc., Salem, Oreg.
Sam Tayloe, general manager, Rio Farms, Inc., Edcouch, Tex.
E. O. Williams, county agricultural agent, Toledo, Ohio
Russell H. Winters, Larsen Co., Green Bay, Wis.

WOOL

John H. Breckenridge, Twin Falls, Idaho
L. T. Dwyer, president, McLoughlin Manufacturing Co., Indianapolis, Ind.
Fred T. Earwood, Sonora Wool & Mohair Warehouse, Sonora, Tex.
C. J. Fawcett, consultant, National Wool Marketing Corp., Boston, Mass.
J. H. Nichols, Jr., senior vice president, Nichols & Co., Inc., Boston, Mass.
Sylvan J. Pauly, The Pauly Ranch, Deer Lodge, Mont.
Howard Vaughn, Mountain View Ranch, Dixon, Calif.
Werner von Bergen, director of research, Forstmann Woolen Co., Passaic, N. J.
J. B. Wilson, secretary, Wyoming Wool Growers Asociation, McKinley, Wyo.
James F. Wilson, division of animal husbandry, Agricultural Experiment Station, University of California, Davis, Calif.

EXTENSION COMMITTEE ON MARKETING

Clifford Alston, extension economist, University of Arkansas, Little Rock, Ark.
L. A. Bevan, director, extension service, University of New Hampshire, Durham, N. H.
G. Alvin Carpenter, assistant director, extension service, Utah State Agricultural College, Logan, Utah.
W. H. Dankers, extension economist, University of Minnesota, St. Paul, Minn.
Miss Frances A. Scudder, professor in extension service and State leader, home demonstration agents, Cornell University, Ithaca, N. Y.
H. R. Varney, dean of agriculture and director of experiment sta ion, West Virginia University, Morgantown, W. Va.

EXPERIMENT STATION COMMITTEE ON REGIONAL RESEARCH

M. H. Campbell, director, agricultural experiment station, Kingston, R. I.
R. W. Cummings, director, agricultural experiment station, State College Station, Raleigh, N. C.
M. A. Farrell, assistant director, agricultural experiment station, State College, Pa.
W. M. Fifield, director, agricultural experiment station, Gainesville, Fla.
James E. Kraus, associate director, agricultural experiment station, Moscow, Idaho.
W. E. Krauss, associate director, agricultural experiment station, Wooster, Ohio.
H. Macy, dean, Institute of Agriculture, University of Minnesota, St. Paul, Minn.
Catherine J. Personious, assistant director, agricultural experiment station, Cornell University, Ithaca, N. Y.
Paul F. Sharp, director, agricultural experiment station, Berkeley, Calif.

EXPERIMENT STATIONS MARKETING RESEARCH ADVISORY COMMITTEE

G. F. Dow, associate director, agricultural experiment station, Orono, Maine
Dr. P. S. Eckert, director, agricultural experiment station, Tucson, Ariz.
C. M. Hardin, director, agricultural experiment station, East Lansing, Mich.
Starley M. Hunter, department of home economics, University of Missouri, Columbia, Mo.
F. J. Welch, director, agricultural experiment station, Lexington, Ky.

STATE DEPARTMENTS OF AGRICULTURE COMMITTEE ON MARKETING

L. Y. Ballentine, commissioner, Department of Agriculture, Raleigh, N. C.
George H. Chick, chief, division of markets, Maine Department of Agriculture, Augusta, Maine
Charles Figy, director, Michigan Department of Agriculture, Lansing, Mich.
Louis Fontenot, Jr., executive secretary, Louisiana State Market Commission, Baton Rouge, La.
Roy Freeland, secretary, Kansas State Board of Agriculture, Topeka, Kans.

Schedule of committee meetings from July 1, 1952, to June 30, 1953

Date	Committee	Place
Aug. 11–12, 1952	Tobacco	North Carolina.
Sept. 5–6, 1952	Experiment Station Committee on Regional Research	Washington, D. C.
Sept. 25–26, 1952	Cotton and Cottonseed	Texas.
Oct. 6–8, 1952	Experiment Station Marketing Research Advisory Committee.	Kentucky.
Oct. 14–18, 1952	Extension Committee on Marketing	Washington, D. C.
Nov. 7–12, 1952	Experiment Station Committee on Regional Research	Do.
Nov. 13–14, 1952	Wool	Do.
Dec. 1–3, 1952	Forest Research	Do.
Dec. 10–12, 1952	Food and Nutrition	Do.
Dec. 15–17, 1952	Livestock	Do.
Dec. 15–18, 1952	Soils, Water and Fertilizer	Do.
Do.	Production Economics	Do.
Dec. 15–17, 1952	State Departments of Agriculture Committee on Marketing.	Do.
Jan. 12–14, 1953	Poultry	Do.
Jan. 21–23, 1953	Deciduous Fruit and Tree Nuts	California.
Do.	Cold Storage	Washington, D. C.
Jan. 26–28, 1953	Dairy	California.
Jan. 29–30, 1953	Sugar	Washington, D.C.
Feb. 2–4, 1953	Grain	Do.
Feb. 11–13, 1953	Oilseeds and Peanut	Do.
Feb. 16–18, 1953	Vegetable	Do.
Feb. 24–26, 1953	Feed	Do.
Mar. 2–4, 1953	Tobacco	Do.
Mar. 9–11, 1953	Citrus	Do.
Mar. 11–13, 1953	Transportation	Do.
Mar. 23–25, 1953	Seed	Mississippi.
Do.	Potato	Washington, D. C.
Mar. 24–27, 1953	Rice	California.
Mar. 25–27, 1953	Experiment Station Committee on Regional Research	Washington, D. C.
Mar. 30–Apr. 1, 1953	Cotton and Cottonseed	Do.
May 7–8, 1953	Experiment Station Marketing Research Advisory Committee.	Do.

PREPARATION FOR ADVISORY COMMITTEE MEETINGS

The work of each committee is facilitated by a Department working group composed of representatives of the agencies and bureaus that carry out work of interest to the respective committees. Eight research coordinators in the Administrator's office serve as executive secretaries of the 24 commodity and functional advisory committees and as chairmen of the corresponding Department working groups.

With the assistance of the working group the executive secretary, before the annual meeting of each committee, prepares a progress report. These reports are for administrative use in program development, coordination, and evaluation and for advisory committee use in formulation of recommendations. A typical report, that on grain, is 71 single-spaced, mimeographed pages. Included for each specific area of work under way is one or more paragraphs which report developments since the last meeting of the committee, including:

(*a*) Progress (or lack of it)
(*b*) Significant findings
(*c*) Publications
(*d*) Plans for the future

Also included in the progress report are recommendations for committee consideration. There are recommendations both for expansion of going work and the initiation of new work. Each of these recommendations includes a statement of the practical problem which the suggested work is designed to solve.

HOW A COMMITTEE FORMULATES RECOMMENDATIONS

Using the progress report, each committee systematically reviews all work under way under four general headings:

(*a*) Production research
(*b*) Utilization research
(*c*) Marketing research
(*d*) Marketing service and educational work

The committee studies the recommendations for committee consideration and supplements those in the progress report by additional suggestions of problems that committee members have encountered in their associations with other producers, processors, and distributors of agricultural products.

Each committee develops a report that includes the following major sections:

(*a*) *General recommendations.*—Dealing with broad subjects involved in the development of research programs.

(*b*) *Special comments regarding work under way.*—Dealing with suggestions for work that should receive decreased emphasis, be discontinued, brought to completion as quickly as possible, or have changes in nature of the work.

(*c*) *Recommendations for new or expanded work.*—Listing, in priority of importance, specific problems on which new or expanded work is needed, under the following headings:

(1) Production research
(2) Utilization research
(3) Marketing research
(4) Marketing service and educational work

Attendance at committee meetings last year averaged 84 percent. A typical meeting was that of the grain committee, held February 2–4, 1953, with 10 of the 11 members attending.

The report of the grain committee which follows indicates the findings of a typical committee after it had devoted 3 days to careful consideration of (*a*) all research and all marketing service and educational work conducted by the Department and cooperating agencies, on grain and grain products; (*b*) problems of producers, processors, distributors, and consumers of grain and grain products that should be the subject of research designed to find solution to the problems.

Similar reports and recommendations in their respective fields are made by each of the 23 other commodity and functional advisory committees.

REPORT AND RECOMMENDATIONS OF THE GRAIN ADVISORY COMMITTEE

FEBRUARY 2–4, 1953

I. GENERAL RECOMMENDATIONS

Basic research.—The committee recommended that increased attention be given to basic research as a long-range approach to a number of problems in the field of grains. Basic research is very often involved and time consuming and results therefore are not always productive. However, if our country is to meet the increased demand for greater food production and improve the preservation of our food supplies we need a stockpile of basic knowledge. The long-time investment in this type of research should return its cost many fold in future years.

National facilities for preservation of breeding stocks.—To make sure that valuable germ plasm and plant breeding stocks are available for not only present crop improvement research but for future years, a seed-storage facility maintained and operated on a national scale is needed. A specific appropriation for the construction of such a facility along with adequate funds for its maintenance and operation should be provided at the earliest possible date.

Regional research programs.—The committee was pleased to learn of the progress being made by the Department in cooperation with State experiment stations in the development of regional wheat research programs. Various groups representing producers, processors, distributors, transportation companies, equipment manufacturers, and others are cooperating in the development and support of such programs. This cooperative effort should be continued until the programs

and organizational structures are completed. It was proposed that research programs for other cereal crops be handled in a similar manner as effective workable regional patterns can be developed. It was further proposed that if overall agricultural research, marketing service and educational programs are to be developed in each State and in the United States, we must enlist the cooperation of the various groups and industries referred to above in building and supporting such programs in other areas.

Seizure program to be initiated by Pure Food and Drug Administration.—The committee urged careful consideration of the major problem facing grain producers, handlers, and processors induced by standards imposed in the handling of grain by the Pure Food and Drug Administration. In this connection the need for a greatly expanded program of research and education in protecting grain from infestation, damage, and contamination was emphasized. Greatly simplified techniques for identifying damage and injury which cause heavy destruction and economic loss to producers was urged. The committee proposed that the Department explore with officials of the Pure Food and Drug Administration the need for postponement of the seizure program supposedly scheduled to begin July 1, until such time as the Department's resources for research and education in cooperation with State agencies have been given reasonable opportunity to be developed and carried out. In addition the committee pointed out that further investigation is needed to insure the scientific validity of the premises relied upon by the Pure Food and Drug Administration for their proposed seizure act.

Wheat surplus disposal study.—A substantial increase in the wheat carryover plus reduced exports emphasizes the need for an immediate study of alternative methods of disposal of supplies of wheat in future years. It is generally recognized that acreage allotments and marketing quotas is the least desirable course of action in meeting any surplus threat. The study proposed should include an examination of the mechanics which might be employed to utilize multiple pricing in wheat marketing, fully taking into account the need for exporting flour in world markets. It should also include an analysis of systems of disposal used in nations which compete with the United States in the world wheat market. It should examine, in the best objective tradition of economic research, the probable results in representative postwar years if a multiple price wheat disposal program had been in effect and determine if it would be possible to incorporate into our existing wheat marketing system a multiple price disposal plan.

Unit of measure.—In the interest of economy and greater uniformity in the handling of grain, an effort should be made to measure the merits and evaluate the problems involved in shifting trade in grain from "bushels" to 100-pound units. The investigation should include a study of legal obstacles, institutional changes, and statistical data adjustments required in event such change was instituted.

Alternative and supplemental crops.—There is need to further develop new crops such as safflower as a source of protein feeds and high quality oil. As a longtime program it appears important to have available for production, profitable substitute crops for wheat in the Great Plains and other wheat areas. The development of other adapted crops for rotation purposes should be included in the program. The development of grasses (particularly for limited rainfall areas) which are soil building in character and serve as supplementary pasture crops, should be undertaken on a cooperative basis with the interested States. These grasses should be acceptable as alternative crops for wheat or useful in rotations with wheat.

Bloat in ruminants.—Fundamental research should be undertaken to identify and determine the constituents of forage and grain crops which cause bloat in livestock.

II. COMMENTS REGARDING WORK UNDER WAY

The committee expressed genuine satisfaction with the work under way and the progress being made. They were particularly pleased with the type of progress report prepared for the meeting, copy of which was forwarded to them a month in advance of the meeting for review and study. The report served as a focal point for all discussions and actions of the committee. No significant changes in the conduct of the work included in the program were proposed. In several instances there was a minor difference of opinion among committee members as to the importance of the work. All recommendations for expansion of work now in progress are included in the priority listing under section III of the report.

III. RECOMMENDATIONS FOR NEW AND EXPANDED WORK

Production recommendations

1. *Variety improvement.*—The ever-present threat of new outbreaks of disease and insect attack on small grains emphasizes the importance of increased attention to variety improvement including their resistance to disease and insect infestation. Improvement of wheat varieties should take in account superior milling and baking qualities. This work should include the development of hardy winter wheat varieties for the northern Great Plains area and the development of disease-resistant commercial barley varieties.

2. *Disease reaction of small grain.*—Develop more adequate testing facilities to determine the disease reaction of new varieties of wheats, barley, oats and other small grains. Particular attention should be given this problem for the North Central States.

3. *Methods of soil management.*—Expand soils research to devise new and better methods of soil management and erosion control with more adequate consideration to improvement of soil structure, moisture conservation, fertilization and utilization of crop residues, and the development of farm machinery for wind and water erosion control.

4. *Corn hybrids.*—Work on corn hybrids should be expanded to include (*a*) development of high-yielding hybrids that are high in oil, amino acid, vitamin content, and other properties associated with high food and feeding value; (*b*) investigation of corn diseases in the South as a basis for developing disease- and insect-resistant hybrids having desirable agronomic characteristics; and (*c*) development of high yielding, high quality, disease- and insect-resistant white corn hybrids for food industry uses for which white corn is preferable.

5. *Grain sorghums.*—Current work on grain sorghums should be expanded to include the development of (*a*) new grain sorghum varieties for the South which combine adaptation, high yield, and resistance to disease, (*b*) hybrid varieties, and (*c*) cultural and insecticidal measures of insect control correlated with the development of varieties resistant to insects, particularly the midge and webworm.

6. *Grain insects.*—Year-round pasture and additional feed grain crops are needed particularly for the South, to provide winter soil cover and prevent erosion. Small grains hold the greatest promise for meeting this need. Expand work therefore on control of grain and grain sorghum insects for this area including control of corn earworm and corn borer on dent corn.

7. *Insecticide residues.*—The lack of information on the extent to which chemical residues occur in foods consumed by man and animals following the use of insecticides continues as a major obstacle to the maximum utilization of the new pesticide chemicals in the protection of agricultural products from attack by insects. Therefore, the studies on insecticide residues and their toxicological effects on man and animals should be expanded.

8. *Biological control of insects.*—The entire field of the biological control of insects through the use of parasites, predators, and diseases needs more thorough investigation. Additional emphasis on this work should be achieved through expansion of present facilities and personnel.

9. *Soil conditioners.* Recent discoveries of synthetic chemical compounds to improve soil aggregation and stabilization emphasizes the need to explore other materials. It is recommended therefore that a program of chemical modification of agricultural residues be undertaken to produce improved soil stabilizers. Investigations should include fundamental studies into modifying cellulose, hemicellulose, or lignin in order to discover new functional groups necessary to achieve soil stabilization on an expanded scale.

10. *Mineral deficiencies.*—The work on mineral deficiencies in soils should be continued and expanded. This work should include an evaulation of these deficiencies in feeding of all types of livestock.

Utilization recommendations

1. *Improved storage of cereal grains.*—The continued expansion of mechanized methods which result in the harvesting of grains at high moisture content along with the intensified program on sanitation makes it imperative that storage practices be improved. Studies should be initiated to determine safe and efficient chemical methods of treatment for the prevention of mold, heat damage, and deterioration of stored grain. This should include a study of the relationship of moisture content with relative hiumidity as a contributing factor.

2. *Structure of wheat proteins.*—Variations in the properties of protein components of wheat flours have never been adequately explained by studies of chemical composition or molecular size of the proteins. Studies should be undertaken

using new techniques and methods to indicate the sequence, position, or grouping of amino acids or other aspects of structure within the molecule which may affect the performance of gluten in baking. Expanded work should also be undertaken to determine the effect of processing including heat and fermentation on the susceptibility of wheat gluten to enzymatic hydrolysis and the possibility of establishing an index of baking quality for different types of wheat. This work also involves a basic study to determine the physical and chemical properties of the wheat kernel so as to improve milling and baking qualities and provide useful guides to plant breeders.

3. *Basic investigations on enzymes that degrade and synthesize starchlike carbohydrates.*—Undertake basic investigations on the properties and action of enzymes that degrade and synthesize starchlike carbohydrates. The work should also include investigation on the control of the enzyme action to permit production of new foods, fibers, vegetable gums, mucilages, sizing, and coating agents from starch and byproducts.

4. *Sorghum.*—Studies on the composition of carbohydrates, proteins, and byproducts of grain and forage sorghum are recommended to fully utilize these crops. These studies should include the effect of drying, storage, and chemical preservation of these crops for their full development and use. Work should be coordinated with other interested agencies.

5. *Food composition.*—Research on the distribution of the nutrients in grain products should be expanded to supply the data needed to evaluate the place of grain products in the diet. Work should be initiated on the determination of the distribution of vitamin B_{12}, the occurrence of choline in foods and the mineral elements including sodium and calcium as well as trace elements such as molybdenum, copper, selenium, zinc, and manganese and the different forms of carbohydrates.

6. *Human nutrition.*—For a better understanding of the nutritive value of grain products in the diet, studies are needed to determine the factors which influence protein utilization and amino-acid requirements and the role of grain products in meeting these requirements when used in combination with other foods.

7. *Family food consumption, economy, and nutritive adequacy of diets.*—Additional information is needed on how foods are used in the home, the kinds and amounts of wastes, and the distribution of food supplies among family members. To supplement data on food use collected in the 1952 rural survey this work should be extended to the urban families and to institutions with special attention given to the extent of food waste.

8. *Composition of inbred varieties of corn.*—The protein of present commercial varieties of corn is deficient in two essential amino acids required for the most efficient production of livestock. Studies should therefore be undertaken to determine the amino-acid composition of present and new breeding stocks of corn to find varieties or lines rich in essential amino acids. This work should be carried out in cooperation with plant breeders.

9. *Studies on chemical browning for the preservation of quality and nutritive value of foods and feeds.*—Serious losses in quality and nutritive value occur in dried and concentrated foods and feeds during processing and storage. It is recommended therefore that fundamental research be instituted on the chemistry of the browning reaction to develop information which will lead to new processing methods to improve the quality and nutritional value of foods and feeds.

10. *Basic physical information on causes of bread staling.*—Substantial progress has been made in the basic causes of staling of bread. Investigations involving the physical properties of the starch and gluten of bread should be accelerated to provide a rational basis for the development of practical methods to retard staling in commercial as well as canned bread.

11. *Microbial feed supplements.*—Since the use of micro-organisms are the most likely means of providing additional feed supplements, it is recommended that they be studied for the production of proteins containing relatively large amounts of the nutritionally essential amino acids.

Marketing recommendations

1. *Stored-grain insects.*—The constant plague of insect infestation in stored grains and the attendant hazards in the use of new insecticides along with the possible tightened restrictions of Pure Food and Drug Administration, accentuates the need for more effective control of insects in stored grains. Research on this problem should be expanded. Methods other than the use of chemicals should be explored and developed. The work should also include perfection of a quick test for detecting hidden infestation usable for grain-inspection purposes.

2. *New export markets for wheat products.*—The consumption of wheat and wheat products in most of the Asiatic countries is on a restricted basis. In an effort to expand wheat consumption there is need to (*a*) study the various methods of bringing the story of wheat as a food to the Asiatic population masses, (*b*) study the preparation of wheat products for consumer use in these countries, and (*c*) study the technical and baking problems in processing and utilizing wheat products exported from the United States. Consideration should be given to the possibility of carrying out this proposal on a contract basis.

3. *Equipment and structure for handling, drying, and storing grain.*—Drying, handling, and storing studies should be expanded (*a*) to obtain further basic information about drying rates, moisture equilibrium, and airflow resistance of the different grains, and (*b*) to design structures and equipment for greater efficiency and economies. The studies should include all stages of the marketing process.

4. *Shrinkage losses during storage.*—There is need for more accurate information on the amount of shrinkage in grain during storage periods. More factual data should be obtained to replace the rough estimate percentages currently used. Government storage records available should be summarized and evaluated as one source of information.

5. *Wheat glutens.*—Determine differences among the glutens in the different classes, varieties, and lots of wheat which affect bread-baking quality. Such information has possible application in the routine inspection of wheat and in the development of wheat improvement programs. These investigations should be closely correlated with other related work recommended by the committee and of interest to the several agencies.

6. *Quick test for nonreducing sugar content.*—Work recently completed in one of the States shows a marked disappearance of nonreducing sugar in corn as it deteriorates in storage. The evidence obtained so far indicates that the nonreducing sugar content of corn may be a better index of the extent of deterioration than the fat acidity test. Studies should, therefore, determine if this finding is applicable to other grains and if so a quick test for making such determination should be developed.

7. *Quick test for barley viability.*—Viability is the highly important quality factor for malting barley which is not reflected in the present barley standards. It is important, therefore, to develop a quick test for barley viability for use in grain inspection work. This work should also include study of factors which affect the sale of barley at the farm level.

8. *Measurement of moisture.*—There is a continuing need for a rapid and accurate means of measuring the moisture content of grain, forages, and other farm commodities.

9. *Smut determination.*—Research is needed to develop a more accurate method for measuring the smut content of wheat in the Northwest.

10. *Elevator plant and equipment influence on operating costs.*—The study on new investments in elevator plants will provide findings that are basic to planning greater efficiency in the use of new elevator facilities and equipment for various volume specifications. Additional funds should be made available to complete this work promptly.

11. *Elevator location and efficiency.*—The study of the problem of location and size of elevator facilities and equipment for maximum efficiency should be expanded to include transportation costs, elevator operating practices, and services as related to single and multiple units as well as line and management contract operations.

12. *Marketing frozen bakery products.*—The rapid expansion in the use of frozen foods and the application of the freezing process to bakery products pose a whole series of processing and marketing problems. A cooperative study with industry to determine the best methods and techniques for the preparation and marketing of frozen baked products should be undertaken.

13. *Foreign markets.*—Undertake foreign-market surveys by (*a*) bringing up to date existing market information concerning the Far East, (*b*) stationing a grain-marketing specialist in that area, (*c*) determining the potential markets of Latin America, and (*d*) evaluating the impact of production trends of competing exporting countries.

14. *Elevator practices in the Southeast.*—More information is needed on storage methods, equipment, and structures suitable for the Southeast area. Experiences and practices of commercial elevator operators (country, subterminal, and ter-

minal) in the South and Southeast on the conditioning (moisture and insect control) and storing of grains and feeds should be explored, assembled, and evaluated.

15. *Analysis of factors affecting prices, supply, and utilization of grains.*—Expand work on price, supply, and consumption analyses of grain to include wheat and wheat products. The work should include the analyses of factors which determine wheat prices generally, seasonal variation, and price differentials by regions and grades. Analyses of feed use and export demand should be included.

16. *Grain trucking costs.*—It is proposed that a further study be made of the trucking of grain to determine under what conditions and how far grain can be profitably trucked and the effect that trucking has on the total cost of marketing grain.

Marketing service and educational recommendations

1. *Marketing services.*—Provide adequate funds for State marketing services. These operations are on a matched-fund basis and are designed to develop and improve marketing programs and services within individual States.

2. *Grain grading and marketing schools.*—Extend educational programs on grain grading and marketing schools for producers, country grain dealers, and elevator operators to improve grain grading, handling, and marketing.

3. *Variety analysis.*—Develop and expand the educational programs on variety analysis to aid producers, elevator operators, and terminal dealers to improve the purchasing of wheat, reduce variety mixing, induce separate binning, and encourage the payment of price differentials for quality varieties.

4. *Storage and marketing facilities.*—Increased educational work is needed (particularly in the Northeast and Southeast) to aid producers and the trade to better understand marketing problems and to provide types of facilities that will protect quality and encourage more efficient storage, processing, and marketing in these areas.

5. *Elevator organization and management.*—Increased educational work is needed with elevator operators and companies to aid them in analyzing their particular problems and utilizing available research in improving operating methods, efficiency, and services.

6. *Wheat exports.*—The Extension Service should give particular attention to helping producers and the grain trade to keep fully informed on trends in wheat exports and Government programs as well as help interpret current marketing developments and long-time trends.

APPLICATION OF INCREASES IN APPROPRIATIONS AND ESTIMATES

Mr. ANDERSEN. Now what use have you made of the $250,000 increase which we allowed last year for practically the same items for which increases have been requested this year?

Dr. TRELOGAN. We have indicated in our book of projects that we gave to you yesterday, the obligations, project by project, and compared them with the previous year so that you can see the increases in detail.

(The material referred to is as follows:)

Comparison of allotments by financial projects for fiscal years 1952–53

Financial project	Actual allotment, fiscal year 1952	Estimated allotment, fiscal year 1953	Increase
I. Marketing costs, margins, and efficiency	$809,980	$826,400	$16,420
II. Improvement and evaluation of product quality	1,168,576	1,230,300	61,724
III. Improvement in market organizations and operations	1,756,820	1,842,933	86,113
IV. Collection, analysis, and dissemination of market data	1,058,924	1,155,300	96,376
V. Overall administration	167,700	194,400	26,700
Total	4,962,000	5,249,333	287,333

USE MADE OF INCREASE IN AGRICULTURAL MARKETING ACT APPROPRIATIONS FOR FISCAL YEAR 1953 COMPARED WITH FISCAL YEAR 1952

Financial project I, marketing costs, margins, and efficiency

Collection and analysis of data on measurement of costs and margins and determination of operating efficiency covering citrus fruit packing plants and meat retailing has been started. Studies of the relative volumes of agricultural commodities moved by different types of transportation facilities, measurement of transportation rates and costs and their effects on agriculture, has been expanded. Poultry feeds and livestock and meats have received first consideration. Preliminary studies of transportation rates and services on farm supplies have been initiated for the purpose of developing testimony to be used before the Interstate Commerce Commission and other regulatory bodies in the interest of farmers. Work has been started on the problem of cotton ginning costs as affected by the extent to which the ginning plant and equipment are utilized. The preparation of materials on selected topics used in training agricultural workers in marketing is being carried forward somewhat more rapidly.

Financial project II, improvement and evaluation of product quality

Several phases of work involving methods and tests for determining quality factors have been expanded. These include determination of yields of dairy products—particularly milk powder—from a unit quantity of milk, studies to determine the normal fat acidity values for the different kinds of grain of questionable soundness as a step in the development of a simple fat acidity test for soundness; determination of the suitability of the recently developed sedimentation test for use in routine inspection of wheat; development of a simple method for determining moisture content in grains, seeds, and other farm crops and studying the applicability of such method to inspection and grading work; developing better means of determining the maturity of California peaches; and determining quality and condition of eggs in various parts of egg cases.

Expansion is under way in investigations of methods of protecting stored grain and other products from insect damage, and processed fruits and vegetables from insect contamination.

Work has been resumed on ascertaining the qualities and quantities of cotton required for specific products manufactured from cotton.

An increase in funds for educational programs available for State extension services on a matching basis to improve methods of marketing farm commodities—including quality maintenance—has strengthened this work.

Financial project III, improvement in market organizations and operations

Improvement of transportation services and decreases in costs are being sought through initiation of work on assembling milk in tank trucks; conducting tests of refrigerated motortrucks; bringing together for preparation of a handbook, available data on refrigeration requirements and loading practices in the transportation of perishable foods by motortruck; conducting a cooperative study with railroads and State colleges on preventing damage in the railroad transportation of watermelons; and conducting studies on the practicability of large palletized containers for fruits and vegetables packed in consumer-size packages.

Work designed to achieve marketing economies by improving physical facilities has been expanded. Phases covered include a study of marketing facilities and practices and improvements needed in the interest of a more favorable competitive position for producers of feeder cattle and calves in the South; determining the kind of produce marketing facilities needed in additional markets—including St. Paul and Minneapolis, San Diego, Bridgeport, Conn., and local grain markets in South Carolina.

Work simplification and improved materials handling are being studied at a more rapid rate at the Red River Valley Potato Research Center. Through experimentation with the use of palletized containers less costly methods are being developed for handling and storage of potatoes and onions. Other work initiated or expanded includes research in retail stores on receiving, blocking, and cutting meats in service and self-service markets; work to determine the most efficient produce department operations in retail stores; field studies and investigations of handling and compression operations in public cotton warehouses; expediting reports on handling of apples and empty containers in storage plants; and work on visual inspection of products for surface characteristics in grading operations. There has been some acceleration in work designed to improve marketing organizations and operations. Included are work on improved procedures for marketing logs, pulpwood, and other farm forest products; relative advantages of storing

grain in various locations; studying the principles underlying the use classification of milk in fluid-milk markets; determining how freezer locker plants are functioning and how they may be made to function as subdistributors of frozen foods in nonurban areas; and work on improved marketing of industrial molasses and bagasse, and commercial floricultural and nursery products.

The improvement and efficient functioning of individual steps in the marketing process is the goal of expanded work on evaluation of problems associated with dirty and washed eggs in the marketing channels, increased emphasis on the distribution of foundation seed stocks in western forage-seed-producing States, and the addition to the program of one new variety of clover. A few new technical-assistance projects are being conducted by State departments of agriculture with matching funds.

The problem of improving practices followed in pricing and making payments to producers for fruits and vegetables has been attacked in a newly initiated project with attention first being directed to methods in use by citrus concentrators in Florida in paying for fruit.

Financial project IV, collection, analysis, and dissemination of market data.

Increased emphasis is being placed on analysis and dissemination of data. Studies of foreign competition and outlets for agricultural products have been expanded by initiation of work on cotton in the Japanese market. The objective is to determine the causes of the sharp decline in demand for American cotton and to suggest practical measures which might be taken to hold the Asiatic market. Collection of new basic data on market supplies, movements, and prices has been expanded to include significant supplies of fresh vegetables produced for local market, more adequate coverage of cattle on feed for market, and weekly chick placements for use in forecasting broiler marketings. Some expansion has occurred in State department of agriculture programs for collecting agricultural data and market information. Among the new projects is one covering livestock and livestock products in Wyoming.

New work on trade and consumer acceptance and preference studies includes tests on experimental baker's white pan bread made with varying formulas, and products made from cotton such as surgical supplies and electric-wire insulation. Collection and analysis of background information on factors affecting prices, supply, and consumption of farm products has been expanded to include research on fresh and processed vegetables and wheat. Consumer education work conducted by State extension services on a matched-fund basis has been expanded to include demonstrations of effective use of television programs as information media for Ohio farmers and greater activity in consumer educational work in Wisconsin.

NEED FOR ADDITIONAL FUNDS

Mr. ANDERSEN. Why are additional funds needed for the 1954 fiscal year in view of the increase we allowed you last year? Are you going to continue that rate of increase each year in the future?

Dr. TRELOGAN. I treated that subject in my testimony yesterday but I would sure like to discuss it again if you would permit me.

Mr. ANDERSEN. Put something further in for the record at this point.

Dr. TRELOGAN. I appreciate that.

(The material requested is as follows:)

REQUESTS FOR APPROPRIATIONS

For fiscal 1953 an increase of approximately $250,000 was provided by the Congress for marketing research and service work under the Agricultural Marketing Act of 1946. For fiscal 1954 a further increase of approximately $250,000 is requested. The total request for the fiscal year 1954 of $5,500,000 compares with the authorization under the act of $20,000,000 and "* * * such additional funds * * * as the Congress may deem necessary." The increase for 1953 and the requested increase for 1954 follow a reduction for 1952 of nearly $1,000,000 when emphasis was shifted toward the mobilization program. Much additional marketing research and related service work is needed to cope with urgent problems in the field of marketing agricultural products. A large backlog of problems remains untreated.

This work was initiated well after the problems of rising marketing costs, widening margins, falling farm prices, and burdensome product surpluses, which gave rise to the legislation, were upon us. Research should anticipate and precede the problems it is intended to solve if it is to be most productive. Moreover, shortly after the program was initiated the program was sharply curtailed upon the incidence of mobilization and remaining activities were diverted to handling a different set of problems from those undertaken originally. We are now trying to redirect the program back to original objectives to deal with the same types of problems on which earlier work was curtailed.

Up to now our work has been confined to dealing with short-term problems with a shifting pattern. They have been of such magnitude as to absorb our entire resources. Little opportunity has been provided for basic or fundamental research or research on longer-term problems that are clearly foreseen. Consequently an adequate foundation for this work is lacking.

A basic objective of the Research and Marketing Act of 1946 is "* * * to promote through research, study, experimentation, and through cooperation among Federal and State agencies, farm organizations, and private industry a scientific approach to the problems of marketing, transportation, and distribution of agricultural products similar to the scientific methods which have been utilized so sucessfully during the past 84 years in connection with the production of agricultural products so that such products capable of being produced in abundance may be marketed in an orderly manner and efficiently distributed." In keeping with this objective and in view of the many and varied problems arising in the field of agricultural marketing, it is anticipated that further increases in funds will be considered in the future within the limits of overall budgetary considerations.

AVERAGE GRADES AND SALARIES

Mr. ANDERSEN. Now, a little bit in relation to personal services. Mr. Whitten and I through the years have been very much interested in what seemed to be a tendency toward unnecessary upgrading. In reviewing your green sheets, I notice the following upgrading in 1953 over 1952: there is 1 new grade 15, 1 new grade 14, and there are 8 new positions in grade 12. On the other hand, you have 1 less in grade 13, 3 less in grade 11, and some reductions in lower grades. It appears that those in grade 11 have been promoted to grade 12 and the grade 13 evidently has gone up into the 15. Give us a little discussion of that.

Dr. TRELOGAN. As I explained to you earlier, we allot these funds to the agencies in the Department that are best qualified to carry out the work. What you are citing here are summary data that apply to all of the agencies participating in the work. I don't feel that I am sufficiently informed now to give you a detailed explanation of what has happened to those specific jobs that are referred to.

Mr. STRUTTMANN. Let me say that the grade average has stayed constant for the 3 years. It stayed at 7.1 for 1952, that is, the average grade of positions, 7.1 for 1953, and it drops to 7.0 in 1954. The increase in salary for all positions under this account has been $28 in 1953. That is entirely due to within-grade salary advances. On the other hand, there is only a $3 increase coming from 1953 to 1954.

Mr. ANDERSEN. Will you in answer to my question extend your remarks fully in the record.

Mr. STRUTTMANN. Yes, sir.

(The information requested follows:)

COMPARISON OF NEW PERMANENT POSITIONS IN 1953

Three major factors are responsible for the changes in permanent positions between 1952 and 1953, as follows:

1. This appropriation was decreased from $5,932,000 in 1951 to $4,962,000 in 1952, necessitating the elimination of 103 permanent positions. Because of the

late passage of the 1952 appropriation act, many of these positions were eliminated after the start of the 1952 fiscal year. For this reason, these positions appear in the 1952 column, even though they were filled for only a few months of that year, but are necessarily eliminated from the 1953 column.

2. This appropriation was increased from $4,962,000 in 1952 to $5,249,333 in 1953. This increase made it possible to provide for several new projects and to expand the work under some of the going projects, and involved a small increase in the number of permanent positions.

3. In the process of keeping this program continuously adjusted to current needs, changes in individual projects (termination, reduction, initiation, expansion, redirection) occur frequently. These adjustments cause fluctuations in the pattern of staffing, particularly where the work of one agency is decreased while that of another agency is increased.

DEPARTMENTAL

One GS–15. Deputy assistant administrator for marketing (Office of Administrator, Agricultural Research Administration): Participates with Assistant Administrator for marketing programs in the formulation and development of a broad research program in the field of agricultural marketing and related services to meet needs of farmers, agricultural industries, and the public; coordinates research planning and operations in association with research coordinators in the Office of the Administrator; recommends allocation of funds to agencies, based on review and appraisal of proposed work; assists in developing policies and methods aimed at establishing desirable working relationships and interchange of results between agencies of the Department and between the Department and State agencies, industry organizations, and private individuals; and serves in place of the Assistant Administrator in all matters as may be required. (Employee transferred, without change in grade, from Production and Marketing Administration.)

One GS–14. Research coordinator (Office of Administrator, Agricultural Research Administration): Serves as executive secretary of several commodity advisory committees established under the Research and Marketing Act of 1946, involving preparation of condensed progress reports on selected work of interest to each committee, listing of problems or fields of work for their consideration, securing participation by Department specialists, and recording actions taken and recommendations made by the committee; coordinates research programs to provide for needs and requirements of related regulatory, control, and service programs; and reviews and evaluates research programs with respect to interrelationships among the production, utilization, and marketing phases. (Position now vacant.)

One GS–12. Agricultural economist (Bureau of Agricultural Economics): Conducts and directs economic research relating to the efficiency of marketing agencies in the use of resources; the responsiveness of marketing organizations to changing supply and demand; the market pricing, procurement, and selling practices; the effects of special marketing programs and changes in marketing procedures and programs, and the factors affecting the structure, organization, and integration of the market. Consults and works with State colleges, representatives of producers, and other Government officials during the conduct of the research and publication of the results therefrom. (Positions previously allocated in GS–11; allocation changed to GS–12 October 1952 upon review of duties performed.)

One GS–12. Agricultural economist (Farm Credit Administration): Initiates and reviews proposals for research projects relating to fruit and vegetable marketing; develops plans for conducting projects, gathers and analyzes required data, and prepares findings for publication; represents Cooperative Research and Service Division on various technical and advisory committees set up under Department research and marketing programs; and handles correspondence and contacts relating to studies and service assignments. (Employee was promoted from GS–11 position formerly occupied.)

One GS–12. Agricultural economist (Office of Foreign Agricultural Relations): Studies the possibilities of expanding exports of United States agricultural products through the various trading devices developed by foreign countries in balance-of-payments difficulties; collects and analyzes data on the impact of United States and foreign tariffs and of changes in these tariffs on American farm products. (Employee transferred from GS–11 position in Bureau of Agricultural Economics.)

One GS–12. Agricultural statistician (Bureau of Agricultural Economics): Conducts and directs statistical research and analysis to determine the effect of market prices, administered price policies, consumer incomes, foreign demand,

taxation, and other factors upon consumption, production, and marketing of farm commodities and upon farmers' receipts, and is responsible for preparation of reports in proper form for Congress, administration officials, and the general public. (Employee was transferred to this fund, without change in grade, from other statistical work under the Bureau's salaries and expenses appropriation.)

One GS–12. Extension economist in marketing (Extension Service): Works with State extension services in analyzing fruit and vegetable marketing problems, organizing, planning, and conducting Agricultural Marketing Act extension projects; assists in the development of regional or area projects; provides technical assistance; prepares subject matter material; suggests improved teaching methods; and coordinates work with other Federal marketing economists. (Position now vacant.)

FIELD

One GS–12. Agricultural engineer (Bureau of Plant Industry, Soils, and Agricultural Engineering): Develops basic moisture-testing methods that are more uniform and reproducible than those now available and develops reliable practical methods and equipment particularly needed for the determination of moisture in grains, beans, dry peas, hay, straw, hops, and agricultural and vegetable seeds. (Position now vacant.)

One GS–12. Agricultural statistician (Bureau of Agricultural Economics): Directs statisticians and clerks in a State office in the developing of data relating to production, supplies, utilization, movement, and prices of agricultural commodities, and preparation of data in suitable form for submission to headquarters office for consolidation and dissemination. Cooperates closely with representatives of State colleges, farmers, and private concerns, in carrying out the above functions. (Position now vacant.)

One GS–12. Entomologist (Bureau of Entomology and Plant Quarantine): Plans and executes research program on development of methods of preventing contamination of processed fruits and vegetables by insects and insect fragments. (Employee was transferred to this fund without change in grade from other work under the Bureau's salaries and expenses appropriation.)

Economists

Mr. Andersen. Discuss the 52 positions under the Agricultural Marketing Act classified as economists. I want a detailed breakdown as to their duties, their grades, and where they work.

Dr. Trelogan. All right. Should we make a presentation in the record on that?

Mr. Andersen. Yes.

(The information requested is as follows:)

Economists Under the Agricultural Marketing Act as Shown in the 1953 Column of the 1954 Budget

The 52 economists under the Agricultural Marketing Act are employed in the various agencies of the Department to which these funds are allotted, in order to carry out the specific lines of work falling within each agency's responsibilities. They are needed for their special skills in economics to advise on, administer, supervise, or perform research or other professional work in agricultural economics, including the investigation, study, analysis, and interpretation of the economic factors and conditions affecting the marketing, distribution, price, utilization, and consumption of agricultural products and the economic factors and conditions affecting agriculture in such fields as transportation and international trade.

For each of these positions, the grade, title, and bureau or agency are shown in the following tabulation:

Agency and grade	Number of positions	Title
Bureau of Agricultural Economics:		
GS–14	2	Agricultural economist.
GS–13	3	
GS–12	4	
GS–11	5	
GS–9	6	
Total	20	
Farm Credit Administration:		
GS–13	6	Do.
GS–12	5	
GS–11	2	
GS–9	3	
Total	16	
Office of Foreign Agricultural Relations:		
GS–14	1	Do.
GS–13	2	
GS–13	1	International trade economist.
GS–12	1	Agricultural economist.
Total	5	
Forest Service:		
GS–12	1	Forest economist.
GS–9	2	
Total	3	
Production and Marketing Administration: GS–11	1	Agricultural economist.
Extension Service:		
GS–12	1	Extension agricultural economist.
GS–12	5	Extension economist in marketing.
GS–11	1	
Total	7	
Grand total	52	

There follows a discussion of the duties of each of the economists, or groups of economists, listed in the 1953 column of the 1954 detail of personal services:

BUREAU OF AGRICULTURAL ECONOMICS

The work of the 20 agricultural economists (2 GS–14; 3 GS–13; 4 GS–12; 5 GS–11; and 6 GS–9) in this Bureau is as follows:

Twelve economists are engaged in work on marketing costs and efficiency. This area of research deals with the efficiency and costs of marketing farm products, including detailed breakdowns of costs and margins in the various stages and channels of handling and processing, the services associated with marketing charges and costs, and the factors affecting the efficiency with which marketing services are performed, such as channels employed, size, organization, and location of firms, methods, practices, and equipment employed. Data are analyzed for the purpose of suggesting changes which would provide the basis for increasing the efficiency with which the various segments of the marketing industry perform marketing services. Much of this work is carried on in cooperation with the departments of agricultural economics of the State colleges and agricultural experiment stations. A number of contracts dealing with such matters as the economics of retailing, costs of alternative methods of processing, waste disposal, etc., also require the supervision of trained economists.

Three economists are utilized in the field of market structure and practices. This line of work involves a study of the relationships between marketing channels, structure, or practices and the efficiency with which marketing services are performed, the adequacy and availability of such markets and services, and particularly the effectiveness of the price-making process at various levels of marketing. Included here are analyses of price and marketing policies of buyers and sellers, the effects of varying degrees of competition in the market place, the impact of specialized marketing institutions such as futures trading, the impact of Federal, State, and local laws and regulations, and the effects on marketing efficiency of public and private marketing programs. Most of this work is undertaken under

contract with important universities and research institutions, such as Harvard, Chicago, Vanderbilt, and the Brookings Institution, which have economists on their staff whose interests, skills, and contacts make them particularly well qualified to carry forward research projects in this area. It is necessary to maintain continuing contact with contractors in order to insure proper planning, progress, and integration of the work, and conformity to contract requirements.

Four economists are engaged in transportation research. This field of research covers the study of the effects of transportation costs and services on agriculture for the purpose of suggesting changes which will improve the overall efficiency of marketing and transporting farm products. Service work includes assisting other agencies of the Department, and preparing and presenting testimony before the ICC. Cooperative working relationships are maintained with other transportation economists, with agricultural economists in other agencies and in the State colleges. Some supervision of contract work is involved.

The function of general oversight and coordination of economic research throughout the Department has been assigned to the Bureau of Agricultural Economics. One economist reviews all economic research projects and serves as consultant for the entire Department on economic research projects. He supervises Bureau relationships with research advisory committees, including the preparation of materials for their use and the development of response to recommendations made by these committees. He serves also in planning participation in cooperative activities between Bureau and State workers.

FARM CREDIT ADMINISTRATION

Six GS–13 agricultural economists direct difficult marketing research assignments requiring close working relations with officials of cooperative marketing associations and other marketing firms, and with staff members of departments of agricultural economics of State colleges. They supervise other agricultural economists assisting them on such assignments. They direct research relating to the following: Costs and efficiency in the marketing of poultry products and of processed fruits and vegetables; developing and testing improved methods of measuring the market value of meat-type hogs and of determining the butterfat content and other quality factors of fluid milk; analyzing factors influencing farm-to-market milk-hauling costs; studying the effectiveness of pricing plans for fluid milk and for fresh fruits and vegetables; developing improved methods and techniques in processing meats in small plants, in processing oilseeds, and in handling, storing, and drying grain; and improving methods and facilities in packing citrus fruits, in marketing livestock, and in distributing frozen food products through locker plants.

Ten agricultural economists (5 GS–12; 2 GS–11; and 3 GS–9) under general supervision of GS–13 agricultural economists are carrying on difficult research assignments. Such research projects relate to the following: Analyzing the factors influencing costs and efficiency in the ginning of cotton, and in the manufacture and distribution of mixed feeds; and developing means of making more effective use of transportation facilities in marketing farm products and distributing farm production supplies. They also handle important segments of research listed in the preceding paragraph relating to costs and efficiency in processing fruits and vegetables and in handling and marketing poultry products.

OFFICE OF FOREIGN AGRICULTURAL RELATIONS

One GS–14 agricultural economist is headquartered in Paris, France, in the interest of promoting the sale of United States cotton in Western Europe.

One GS–13 agricultural economist is engaged in a survey of intercooperative trade. He is making a survey of European consumer cooperatives, their methods of operation, and the commodities which they purchase and distribute, bringing this information to the attention of United States agricultural producer cooperatives as a means of advising them of opportunities for sales (from United States producer cooperatives to European consumer cooperatives).

One GS–13 agricultural economist is engaged to survey the cattle industry of northern Mexico. An initial survey of number available for export was made in June 1952. It is intended to repeat the survey at the completion of the fall and winter movement of 1952–53 to evaluate changes due to the opening of the border on September 1, 1952.

One GS–13 international trade economist is engaged in analyzing the factors affecting agricultural exports in various important foreign markets and the possibilities of expansion of such exports through various monetary, financial, and trade policies.

One GS–12 agricultural economist is engaged in a study of the possibilities of expanding exports of United States agricultural products through the various trading devices developed by foreign countries in balance-of-payments difficulties and in the collection and analysis of data on the impact of United States and foreign tariffs and of changes in these tariffs on American farm products.

FOREST SERVICE

The three forest economists (1 GS–12 and 2 GS–9) employed in the Branch of Research, Forest Service, are engaged in conducting investigations pertaining to the marketing of farm forest products. This research includes appraisals of existing procedures and organizations for marketing sawlogs, pulpwood, and other products of farm forests, possible means for improving marketing methods, and development of more efficient and adequate systems for making price and other market information available to farmers and other small-forest landowners. These men work in close cooperation with State agencies and various bureaus and agencies of the Department of Agriculture.

PRODUCTION AND MARKETING ADMINISTRATION

One GS–11 agricultural economist (cotton) is concerned with economic studies related to practices, procedures and costs in the testing, sampling, preparation, processing, and marketing of raw cotton and cottonseed. This work covers the operations of representative commercial ginning establishments so that they may be evaluated from the standpoint of efficiency and quality of services.

EXTENSION SERVICE

The work of the six GS–12 extension economists is in the fields of consumer and retailer education, market information, and dairy, poultry, and fruit and vegetable marketing. A brief statement of the nature of the work of each of the six specialists, is as follows:

The work of the three specialists in fruit and vegetable, dairy, and poultry and egg marketing includes the analysis of marketing problems and the preparation of commodity subject matter to facilitate adoption of new research findings and best-known practices, the aim being increased efficiency and improved distribution and utilization of these commodities.

One consumer education specialist assists State specialists in reaching consumers with information about supplies, prices, and uses of abundant foods to encourage the substitution of these foods for those less plentiful.

The retailer education work involves one extension economist assisting retailer specialists in the States in conducting educational programs in the handling and merchandising of foods with the purpose of increasing efficiency and reducing costs and spoilage losses, particularly of perishable products, at the retail level.

The work of one market information specialist deals with orderly marketing of annual and seasonal supplies of farm products through the preparation and dissemination of outlook and other timely market information, and the preparation of market information handbooks.

All these specialists assist State extension services in the 48 States and 3 Territories in organizing, planning, and conducting Agricultural Marketing Act projects; develop, assemble, and evaluate teaching materials and procedures; analyze and appraise State projects; plan and conduct workshops for training specialists; provide leadership for development of needed regional and national programs; provide technical assistance; and coordinate work with other Federal agencies.

One GS–11 extension economist in marketing reviews, marketing research, and other market information materials to appraise results and adapt these for use in developing and conducting effective consumer education and market information programs; and assembles and prepares materials for use by project leaders.

Mr. ANDERSEN. Under what legislative authority are the various divisions of your organization operating?

Dr. TRELOGAN. That is relatively simple in our case. It is all under one statute—the Agricultural Marketing Act of 1946, Public Law 733, 79th Congress, approved August 14, 1946.

Mr. ANDERSEN. Are these all permissive rather than mandatory?

Dr. SHAW. Correct.

Mr. ANDERSEN. I think that is all, gentlemen. Thank you.

We shall adjourn until tomorrow morning at 9:30.

OFFICE OF EXPERIMENT STATIONS

WITNESSES

DR. E. C. ELTING, ASSOCIATE CHIEF, OFFICE OF EXPERIMENT STATIONS
DR. H. C. KNOBLAUCH, ASSISTANT CHIEF, OFFICE OF EXPERIMENT STATIONS
DR. ALLAN H. MICK, ASSOCIATE DIRECTOR OF ALASKA AGRICULTURAL EXPERIMENT STATION, OFFICE OF EXPERIMENT STATIONS
WALWORTH BROWN, ADMINISTRATIVE OFFICER, OFFICE OF EXPERIMENT STATIONS
DR. B. T. SHAW, RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, UNITED STATES DEPARTMENT OF AGRICULTURE

Payments to States, Hawaii, Alaska, and Puerto Rico

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$12,428,708	$12,441,208	$13,453,708
Unobligated balance, estimated savings	−6,071		
Obligations incurred	12,422,637	12,441,208	13,453,708

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
1. Payments to agricultural experiment stations	$12,277,984	$12,291,208	$13,273,708
2. Federal administration under Bankhead-Jones Act, sec. 9, title I (act of June 29, 1935), as amended by the act of Aug. 14, 1946 (Research and Marketing Act of 1946)	144,653	150,000	180,000
Obligations incurred	12,422,637	12,441,208	13,453,708

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Total number of permanent positions	23	23	29
Average number of all employees	22	23	27
Average salaries and grades:			
General schedule grades:			
Average salary	$5,779	$5,749	$5,754
Average grade	GS–8.0	GS–7.8	GS–7.9
01 Personal services:			
Permanent positions	$124,485	$130,490	$155,800
Regular pay in excess of 52-week base	488	790	800
Payment above basic rates	266	250	300
Total personal services	125,239	131,530	156,900
02 Travel	14,190	14,000	16,000
03 Transportation of things	625	470	600
04 Communication services	532	600	800
06 Printing and reproduction	1,933	2,000	3,000
07 Other contractual services	54	100	100
Services performed by other agencies	169	200	300
08 Supplies and materials	534	500	800
09 Equipment	1,317	500	1,400

Obligations by objects—Continued

Object classification	1952 actual	1953 estimate	1954 estimate
11 Grants, subsidies, and contributions:			
Hatch Act, approved Mar. 2, 1887	$719,823	$720,000	$720,000
Adams Act, approved Mar. 16, 1906	719,848	720,000	720,000
Purnell Act, approved Feb. 24, 1925	2,879,993	2,880,000	2,880,000
Bankhead-Jones Act, secs. 3 and 5, title I (act of June 29, 1935)	2,863,504	2,863,708	2,863,708
Bankhead-Jones Act, secs. 9 and 11, title I, of the act approved June 29, 1935, as amended by the act of Aug. 14, 1946 (Research and Marketing Act of 1946)	4,849,816	4,850,000	5,820,000
Hawaii Act, approved May 16, 1928	90,000	90,000	90,000
Alaska Act, approved Feb. 23, 1929	15,000	15,000	15,000
Alaska Act, approved June 20, 1936, as amended by the act of Aug. 29, 1950	50,000	62,500	75,000
Puerto Rico Act, approved Mar. 4, 1931	90,000	90,000	90,000
15 Taxes and assessments	60	100	100
Obligations incurred	12,422,637	12,441,208	13,453,708

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$18,668	$14,670	$15,078
Obligations incurred during the year	12,422,637	12,441,208	13,453,708
	12,441,305	12,455,878	13,468,786
Deduct:			
Unliquidated obligations, end of year	14,670	15,078	16,086
Adjustment in obligations of prior years	3,075		
Total expenditures	12,423,560	12,440,800	13,452,700
Expenditures are distributed as follows:			
Out of current authorizations	12,408,014	12,426,800	13,437,700
Out of prior authorizations	15,546	14,000	15,000

Mr. ANDERSEN. The committee will come to order, gentlemen. We will insert pages 78, 79, 81, 86 through 99 of the justifications at this point.

(The data referred to are as follows:)

OFFICE OF EXPERIMENT STATIONS

PURPOSE STATEMENT

The Office of Experiment Stations as presently organized was established in 1888 following passage of the Hatch Act of 1887 authorizing Federal grants for State agricultural experiment stations.

The primary function of the Office of Experiment Stations is the administration of the acts of Congress authorizing Federal-grant funds for research at the agricultural experiment stations of the land-grant colleges in the States, Hawaii, Alaska, and Puerto Rico. A major responsibility involved in this function is the coordination of research effort among the State experiment stations and between these experiment stations and the research agencies of the Department of Agriculture. The Office also has responsibility for operating the Federal experiment station in Puerto Rico and the Virgin Islands agricultural program.

Grant-fund administration.—Administration of grants to the States involves (1) advance approval of each individual research proposal financed in whole or in part from the Federal-grant funds to assure their efficient and legal use; (2) close advisory relations with the experiment stations for which funds are expended; (3) annual field examination of the research and expenditures of each experiment station under the several grant acts; and (4) preparation of an annual report to Congress on this research, as required by law. There are currently active approximately 4,500 specific lines of agricultural investigations being financed from Federal-grant funds which are a responsibility of this Office, as well as approxi-

mately 5,350 other lines of inquiry at the State agricultural experiment stations which are supported from non-Federal funds.

Research coordination.—The Office participates actively in the planning and coordination of research among the experiment stations and between the stations and the Department of Agriculture. Members of the technical staff of the Office (1) assist the States in planning cooperative research programs to secure integration and full coordination; (2) assist Federal research agencies in arranging for cooperation with the States; (3) actively participate in planning conferences and work groups engaged in development of regional research involving two or more States; and (4) suggest to the States lines of inquiry most needed to establish well-rounded regional programs.

Administration of programs in Puerto Rico and the Virgin Islands.—The Office is responsible for administering the Federal experiment station in Puerto Rico, which serves as a tropical outpost of the Department for the conduct of agricultural research dealing principally with the development and production of crops of strategic importance which can be grown only in the tropics and with other crops which may be of economic importance especially to the Southern States. It also is responsible for administering an agricultural program in the Virgin Islands dealing with research on soil and water conservation, improvement of crop plants for commercial and home use, and development of better rural living conditions.

Administration of research program in Alaska.—Agricultural research in Alaska is carried on as a joint program of the United States Department of Agriculture and the University of Alaska. Under a joint director mutually agreeable to the university board of regents and the Research Administrator of the United States Department of Agriculture, investigations are conducted in soil analysis, horticulture, animal husbandry, agricultural economics, agricultural engineering, insect control, and field crop improvement.

As of November 30, 1952, the Office had 143 employees, 58 of whom were in Washington and the balance in the field.

	Appropriated, 1953	Budget estimate, 1954
Appropriated funds:		
Payments to States, Hawaii, Alaska, and Puerto Rico	$12,441,208	$13,453,708
Salaries and expenses	380,000	380,000
Virgin Islands agricultural program	100,000	100,000
Research on agricultural problems of Alaska	270,000	270,000
Total	13,191,208	14,203,708

Payments to States, Hawaii, Alaska, and Puerto Rico, Office of Experiment Stations

Appropriation act, 1953	$12,441,208
Budget estimate, 1954	13,453,708
Increase	+1,012,500

Summary of increases, 1954

To strengthen the research programs of the State agricultural experiment stations as authorized by title I, sec 9, or the Bankhead-Jones Act, as amended	+$1,000,000
To strengthen agricultural research at the Alaska Experiment Station as authorized by the Alaska Station Act of Aug. 29, 1950 (Public Law 739)	+12,500

Project statement

Project	1952	1953 (estimated)	Increases	1954 (estimated)
1. Hatch Act (Mar. 2, 1887)	$719,823	$720,000		$720,000
2. Adams Act (Mar. 16, 1906)	719,848	720,000		720,000
3. Purnell Act (Feb. 24, 1925)	2,879,993	2,880,000		2,880,000
4. Bankhead-Jones Act, secs. 3 and 5, title I (act of June 29, 1935)	2,863,504	2,863,708		2,863,708
5. Bankhead-Jones Act, secs. 9 and 11, title I of the act approved Jun 29, 1935, as amended by the act of Aug. 14, 1946 (Research and Marketing Act of 1946)	4,994,469	5,000,000	+$1,000,000	6,000,000
6. Hawaii Act (May 16, 1928)	90,000	90,000		90,000
7. Alaska Act (Feb. 23, 1929)	15,000	15,000		15,000
8. Alaska Act (June 20, 1936) as amended by the act of Aug. 29, 1950 (Public Law 739)	50,000	62,500	+12,500	75,000
9. Puerto Rico Act (Mar. 4, 1931)	90,000	90,000		90,000
Unobligated balance	6,071			
Total appropriation or estimate	12,428,708	12,441,208	+1,012,500	13,453,708

STATUS OF PROGRAM

General

The several appropriations under "Payments to States, etc." represent the Federal Government's support and encouragement to the State, Territorial, and Puerto Rican agricultural experiment stations which were established as departments of the land-grant colleges pursuant to the provisions of the Hatch Act of 1887.

The State agricultural experiment stations conduct research and experiments along the lines authorized by the several Federal-grant fund acts and the complementary acts of the States on the many problems constantly encountered in the development of a permanent and sustaining agriculture and in the improvement of the economic and social welfare of the farm family. Because of differences in the climate, soil, market outlets, and other local conditions, each State has distinct problems of production and marketing of crops and livestock. The farmers in the individual States naturally look to their State agricultural experiment stations for solution of State and local problems, and in recent years have requested increased service to help meet changing conditions.

The research programs of the State stations, to be most effective, include participation in regional and national programs. Joint attack by a group of State stations is the most effective and often the only practical approach to problems of common interest. The stations, to an ever-increasing extent, are acting as regional groups to provide cooperative coordinated attacks on problems of regional and national interest. In a similar manner, the research programs of the State agricultural experiment stations and the Department of Agriculture are supplementary and interdependent.

These Federal-grant funds constitute a powerful force in bringing about interstate cooperation and Federal-State collaboration in the planning and conduct of this overall program of agricultural research. Therefore, the full impact of the Federal-grant funds on this program cannot be fully evaluated solely on the basis of the amount of funds thus provided.

Research at the stations during the fiscal year 1952 included approximately 4,500 specific lines of research financed wholly or in part by Federal-grant funds and about 5,100 lines of research under non-Federal funds available to the stations.

These lines of research are continued as long as they are progressively productive; 15 to 18 percent of the research program passes its point of maximum productiveness annually and is replaced by new research on pressing problems.

Distribution of payments

The following table indicates the distribution of funds to the various stations during the fiscal year 1953 under the formulas contained in the authorizing legislation.

Distribution by State of Federal-grant funds authorized by the Hatch, Adams, and Purnell Acts, and title I, secs. 5 and 9, Bankhead-Jones Act, fiscal year 1953

State	Hatch, Adams, and Purnell Acts [1]	Title I, sec. 5, Bankhead-Jones Act	Title I, secs. 9 (b) 1 and 9 (b) 2 Bankhead-Jones Act	Total Federal-grant funds
Alabama	$90,000	$88,305.89	$110,951.42	$289,257.31
Alaska	77,500	4,736.40	21,897.67	104,134.07
Arizona	90,000	16,740.68	31,555.35	138,296.03
Arkansas	90,000	66,187.20	92,077.41	248,264.61
California	90,000	102,716.44	100,040.45	292,756.89
Colorado	90,000	25,460.16	41,704.75	157,164.91
Connecticut	90,000	22,514.38	33,720.25	146,234.63
Delaware	90,000	5,970.02	24,223.71	120,193.73
Florida	90,000	48,046.76	54,520.75	192,567.51
Georgia	90,000	98,402.95	114,823.78	303,226.73
Hawaii	90,000	10,463.17	29,104.26	129,567.43
Idaho	90,000	16,866.19	36,317.87	143,184.06
Illinois	90,000	99,478.95	106,079.33	295,558.28
Indiana	90,000	79,141.32	91,911.89	261,053.21
Iowa	90,000	74,227.20	93,450.46	257,677.66
Kansas	90,000	53,057.23	64,482.63	207,539.86
Kentucky	90,000	93,378.88	114,799.30	298,178.18
Louisiana	90,000	60,813.78	78,147.27	228,961.05
Maine	90,000	22,270.68	36,911.04	149,181.72
Maryland	90,000	36,488.62	46,382.67	172,871.29
Massachusetts	90,000	36,698.19	41,538.57	168,236.76
Michigan	90,000	93,777.64	100,436.75	284,214.39
Minnesota	90,000	68,128.03	90,784.00	248,912.03
Mississippi	90,000	80,016.75	114,585.53	284,602.28
Missouri	90,000	78,849.57	101,166.09	270,015.66
Montana	90,000	18,004.00	34,588.91	142,592.91
Nebraska	90,000	41,343.56	56,828.27	188,171.83
Nevada	90,000	3,435.49	21,930.46	115,365.95
New Hampshire	90,000	11,363.43	27,685.69	129,049.12
New Jersey	90,000	32,575.43	41,113.51	163,688.94
New Mexico	90,000	17,027.28	34,608.81	141,636.09
New York	90,000	107,782.14	100,981.53	298,763.67
North Carolina	90,000	135,186.64	155,602.00	380,788.64
North Dakota	90,000	26,670.28	43,717.85	160,388.13
Ohio	90,000	118,853.05	120,921.60	329,774.65
Oklahoma	90,000	63,847.68	74,538.67	228,386.35
Oregon	90,000	35,230.21	48,228.83	173,459.04
Pennsylvania	90,000	155,317.78	129,669.90	374,987.68
Puerto Rico	90,000	66,036.41	106,960.43	262,996.84
Rhode Island	90,000	6,257.12	23,151.98	119,409.10
South Carolina	90,000	68,111.24	88,129.06	246,240.30
South Dakota	90,000	26,510.78	43,240.83	159,751.61
Tennessee	90,000	92,293.90	116,614.29	298,908.19
Texas	90,000	150,461.58	155,668.56	396,130.14
Utah	90,000	12,499.09	29,967.72	132,466.81
Vermont	90,000	12,884.06	29,549.95	132,434.01
Virginia	90,000	88,612.55	99,573.92	278,186.47
Washington	90,000	43,950.86	54,860.22	188,811.08
West Virginia	90,000	65,794.28	72,054.15	227,848.43
Wisconsin	90,000	73,259.15	92,167.38	255,426.53
Wyoming	90,000	7,662.93	26,032.12	123,695.05
Total	4,577,500	2,863,708.00	3,599,999.84	11,041,207.84
Regional research fund [2]			1,250,000.00	1,250,000.00
Grand total	4,577,500	2,863,708.00	4,849,999.84	12,291,207.84

[1] Alaska $15,000 Hatch, $15,000 Adams, and $47,500 Purnell funds; all other stations $15,000 Hatch, $15,000 Adams, and $60,000 Purnell funds.

[2] These funds allotted to regional research projects recommended by the Committee of Nine, in accordance with procedures outlined in sec. 9 (b) 3, title I, of the Bankhead-Jones Act as amended.

TABLE B.—*Statement of direct payments to States, Hawaii, Alaska, and Puerto Rico, indicating those requiring offset and those not requiring offset, and basis of distributions, as estimated for 1954*

Item	Total estimate, 1954	Amount to be paid without offset	Amount requiring offset and basis of allotment	
			Amount	Basis of allotment
Hatch Act	[1] $720,000	$720,000	None	Equal amounts to each State.
Adams Act	[1] 720,000	720,000	None	Do.
Purnell Act	[2] 2,880,000	2,880,000	None	Do.
Bankhead-Jones Act, secs. 3 and 5, Title I.	2,863,708	----------	$2,863,708	Principally on the basis of rural population in the States, Territories, and Puerto Rico.
Bankhead-Jones Act, secs. 9 and 11, title I (as amended by the act of Aug. 14, 1946).	5,820,000	1,500,000	4,320,000	20 percent in equal amounts to each State, Territory, and Puerto Rico; not less than 52 percent by formula; ½ on basis of relative rural population, ½ on basis of relative farm population, 25 percent as regional research funds.
Hawaii Station Act	90,000	90,000	None	
Alaska Station Act of Feb. 23, 1929	15,000	15,000	None	
Alaska Station Act of June 20, 1936 as amended by the Act of Aug. 29, 1950.	75,000	75,000	None	
Puerto Rico Station Act	90,000	90,000	None	
Total, direct Federal payments	13,273,708	6,090,000	7,183,708	

[1] $15,000 to each State.
[2] $60,000 to each State.

Examples of research findings that reached the stage of public application during the year

1. *Empire cotton strains show wilt resistance.*—An outstanding example of the dollars-and-cents value of experiment-station plant-breeding programs is that of Empire cotton. This variety, developed from a single plant isolated by the Georgia Experiment Station in 1935, had a total planting of some 1½ million acres in 9 States in 1951. On the basis of data obtained from 1952 locations during the 3 crop-years 1948–50, the variety netted growers from $12 to $27 more per acre than the usual commercial varieties. Using the single parent plant, the Georgia station developed 10 families, out of which 5 families were chosen for selection of more than 30 promising sublines. In the past year screening tests of several lines of Empire strain No. 8 have shown sufficient tolerance to verticillium wilt to be considered of economic value to farmers. Seed of these lines is being increased for further testing before release to the public.

2. *New approach to range management.*—Monthly chemical analyses of the roots and stubble of five important range grasses grown in Oklahoma have revealed the season when reserves of plant food are lowest and highest in each species, thus establishing a new approach to successful range management. This research, carried on by the Oklahoma station, tells when each kind of grass must be protected from heavy grazing and also the season of the year when each of the grasses provides most nourishment. For instance, blue grama, one of the best range grasses, is lowest in food reserves in October, whereas most range grasses are lowest in nutrients in May. The data enable the practical range operator to select combinations of grasses and rotations that will provide an extended grazing season and to increase carrying capacity with a minimum loss of established stands.

3. *Cartons replace wooden lemon boxes.*—Economic and engineering studies carried on by the California Experiment Station are responsible for development of a half-box paper carton that is rapidly replacing the standard wooden box in the shipping of lemons. Material costs were reduced from 76 cents for the standard box to 41 cents for sealed cartons and to 30 cents for open-top cartons. Twelve of the paper cartons can be made from the wood previously required to make one standard box. The cartons are expected to replace the standard wooden boxes in the next 3 years.

4. *Hybrid seed corn without detasseling.*—Research at the Connecticut Agricultural Experiment Station and at Illinois and other experiment stations has resulted in a promising method for growing hybrid seed corn without the tedious and costly hand removal of tassels. The method is based on using, in crossing fields, corn plants which produce no pollen on their tassels (male-sterile) but have normal seed-making parts as the female parents. Almost any standard hybrid or inbred corn can be made pollen-sterile by an ingenious method of crossing and back-crossing, and the process has been so perfected that it is now being adopted in commercial hybrid-seed production. The Illinois station estimates that the complete elimination of detasseling in commercial hybrid-seed production will bring about an annual reduction of $10 million in cost of production.

5. *Radioactive materials speed animal-nutrition research.*—Use of radioactive substances has enabled the agricultural experiment stations to rapidly step up their fundamental research program in fields such as animal nutrition.

The Florida station had previously established that cobalt deficiency caused serious disease in cattle. Then, through the use of radioactive copper, station scientists found why animals break their legs where a cobalt deficiency exists. The New Hampshire station has shown by means of radioisotope techniques that under modern and intensive roughage programs livestock may develop serious nutritional deficiencies of some minor elements like cobalt. To cope with this problem, the Michigan station is studying the functions of cobalt in normal metabolism. When radioactive cobalt was fed to chickens, the bacteria of the intestinal tract were found to compete strongly for this mineral with the bird's body tissue.

The Tennessee station, in close cooperation with the Oak Ridge Laboratory, is using radioactive substances to learn what happens to feed as it passes from the gut into the body of cows or other animals and to establish the relative importance of calcium from organic and inorganic sources in milk production. The California station, using radiophosphorus, has been able to differentiate between the phosphorus that is absorbed and used and that which is not assimilated by the dairy cow. This finding has value for estimating the "true digestibility" of phosphorus in livestock feeds.

Other radioactive substances are being used to study the synthesis of milk components by the dairy cow. By using radioactive iodine, the Missouri station has discovered one of the principle reasons why high temperatures in summer depress milk production. Their research showed that high temperature, by reducing thyroid activity, reduces the general metabolism and the amount of energy available for milk secretion.

The Utah station has determined how certain hormones in the body affect the utilization of minerals. With radiophosphorus, for instance, the utilization of phosphorus was less with castrated than normal animals. At the Wyoming station radioisotope techniques are being used to study the mechanism of selenium poisoning in livestock, a problem of great importance in western grazing areas.

6. *Faster-moving livestock auctions.*—Livestock auctions can be operated with about one-third less labor, with avoidance of many common delays, with potential savings of $100 per sales day, and with a considerable saving of time to auction patrons. These benefits were demonstrated through the development of a model auction by the Texas Agricultural Experiment Station, cooperating with United States Department of Agriculture. The model auction, which incorporated the best features of all the actions studied, grew out of research that included time-and-motion studies on such customary operations as unloading, tagging, penning, bringing cattle to the ring, selling, repenning, and loading.

7. *Basic studies on root exchange capacities.*—New knowledge about the behavior of roots of different plant species on specific soil types is being uncovered in research conducted at the Arizona, Massachusetts, and Missouri Experiment Stations. Through the basic findings in these experiments, crop scientists can explain better to farmers why some plant species do or do not thrive on certain soils, or why some species compete with others in pastures. For instance, in mixed pastures including clovers and grasses, the grasses usually become firmly established whereas the clovers often die out in 2 or 3 years.

The Massachusetts station showed that such plants as the clover family have a capacity for holding in an exchangeable form twice the quantity of ions (electrically charged nutrient particles) as plants such as grasses. This adds to the understanding of why legumes are higher in calcium and magnesium than are the common pasture grasses and cereals. The latter, on the other hand, are

higher in monovalent nutrient potassium, explaining why grasses and small grains grow better than legumes on soils low in available potassium.

The Missouri station learned that hydrogen ions are associated with plant root surfaces in an exchangeable form, and that these ions are exchanged for nutrients in the soil. The amount of hydrogen on root surfaces was found to vary with nutrient treatments made during growth, the age of the plant, the species, and temperature.

The Arizona station showed that the uptake of calcium, potassium, and sodium was greatly increased when plants were exposed to an electrical voltage representing the potential for the respective ions. This new information about differences in cation exchange capacities of the roots of different species when used with other known principles about nutrient adsorption provides a more scientific basis for recommending fertilizer treatments and pasture mixtures to fit varying soil conditions.

8. The Michigan station has demonstrated that crop yields from once-over tillage are just as high as those from other methods of tillage, and in many instances higher. The station conducted tests in which individual tillage operations were combined by hitching more equipment behind a tractor and eliminating extra trips over the field. At current rates for custom work, conventional methods of tillage would cost $4 an acre for plowing; $1.50 for disking once $1.50 for dragging once; and $1.50 for drilling—a total of $8.50 an acre. A typical once-over tillage operation would cost $4 for plowing and combined tillage operations, and $1.50 for drilling—a total of $5.50 per acre. This represents a saving of $3 an acre over conventional tillage methods. Plans for simple adaptations of once-over tillage to existing farm machinery are now available to farmers.

9. *Pregnancy test for cows 91 percent accurate.*—Heavy losses are suffered annually in dairy herds as a result of breeding inefficiencies, such as delayed conception. During the past year the Oregon Experiment Station made preliminary announcement of a new, simple test for pregnancy in cows that has proved accurate in 91 percent of the cows tested. It is so simple that a farmer can make the test in his own barn. A chemical is added to urine samples, with the color reaction showing if the cow is pregnant. If the accuracy shown to date can be corroborated further, the test will be recommended as a practice with an expected saving to Oregon dairy farmers of $5 million a year.

10. *New seed cleaner aids grassland program.*—Birdsfoot trefoil is an important hay and forage crop in the Northeastern States. However, competition from chicory or "blue wood," a weed that ripens seed at the same time, is a serious problem. Its wider use could be very profitable if the farmer could obtain weed-free seeds. Customary screening and air-cleaning methods are not satisfactory to separate chicory and trefoil seed because they are of approximately the same size and weight. The Vermont station studied the characteristics of each kind of seed and found that the trefoil seed is more nearly round than the chicory seed. The station then developed a simple machine that separates the "rollers" or round trefoil seeds from the "riders" or flatter chicory seeds. An inclined revolving belt or platform allows the round seed to roll off, whereas the flatter seed rides to one side. Trefoil seed growers are now using the new cleaner, which has also proved practical for cleaning other important seed crops.

11. *Chemical control of weeds in cotton.*—The man with the hoe can no longer compete with the man who uses chemicals to control grasses and weeds in cotton fields. The Texas station showed that 6 hoeings were necessary to keep the cotton rows clean at a cost of $13.30 per acre in hand labor. This cost was reduced to $3.29 where a dinitro preemergence chemical was used at planting and followed by two postemergence oilings 7 days apart. Such treatment controlled 97 percent of the Johnson and annual grass seedlings.

REGIONAL RESEARCH FUND

For the conduct of research in which two or more State agricultural experiment stations are cooperating to solve problems that concern the agriculture of more than one State, there is available the "regional research fund" authorized by section 9 (b) 3 of the Bankhead-Jones Act. This fund consists of not more than 25 percent of the amount appropriated under section 9 of the act. Allotments are made to stations on the basis of projects recommended by the Committee of Nine established by the act to represent the State stations.

The following table indicates the distribution of the regional research fund by subject matter:

TABLE C.—*Distribution of regional research fund by subject matter*

	1952	1953
Marketing research:		
Cotton	$29,000	$24,000
Forest products		11,100
Fruits and vegetables	73,400	68,800
Livestock and wool	78,600	87,400
Milk and dairy products	64,389	59,900
Potatoes	45,850	33,500
Poultry and eggs	82,100	70,789
Other	6,800	9,350
Total marketing research	380,139	364,839
Nonmarketing research:		
Beef cattle breeding	122,500	122,500
Cotton improvement and mechanization	117,000	117,000
Dairy cattle breeding and sterility	91,500	91,500
Diseases and parasites—animal and poultry	44,300	41,050
Farm buildings	30,500	24,500
Farm housing	111,450	106,450
Foods and human nutrition	169,700	163,200
Introduction of new plants	74,700	77,700
Pasture and forage crop improvement	24,550	29,100
Poultry breeding	38,300	38,900
Soil management	26,261	53,411
Other	12,700	13,450
Total nonmarketing research	863,461	878,761
Travel by Committee of Nine	6,400	6,400
Total, regional research fund	1,250,000	1,250,000

EXAMPLES OF REGIONAL RESEARCH RESULTS

1. *Progress in research on Newcastle disease of poultry*

The program of research on Newcastle disease is an example of what may be done when research workers pool their efforts in regional research programs in an attempt to control a serious disease when it threatens an entire industry. This disease, which is highly contagious for chickens, turkeys, other domestic poultry and wild birds, is caused by a virus. It first appeared on the west coast about 15 years ago and from a small beginning has spread very rapidly to proportions of a national menace, one which is a serious and continuing threat to the $3 billion poultry industry.

This cooperative study involving some 20 experiment stations and the Department, is coordinated nationally through an interregional committee, and by means of ready exchange of new technical information, investigators are kept fully informed. One station, Wisconsin, serves as a repository for the storage and detailed study of strains of Newcastle virus and furnishes them to other experiment stations for coordinated work to evaluate standard testing procedures.

Significant developments under this program include:

(*a*) *Infection of humans and related disease in poultry.*—An indication of the potential danger of this disease to humans is brought out in a report from the Minnesota station of an outbreak of eye infections in 40 of 90 workers employed in a poultry dressing plant. Newcastle virus was isolated from 4 of 10 cases examined. The Wisconsin station also reports the possibility of transmission within a human family of Newcastle virus, as demonstrated by isolation of the virus from their nasal washings and saliva. The Rhode Island station isolated Newcastle virus from the lung of a 6-month-old calf. Other respiratory diseases of poultry similar to Newcastle disease are of increasing importance and have recently been included in the regional studies. Among these, "air sac infection," a chronic respiratory disease agent, is receiving particular attention. The association of this condition with Newcastle disease needs to be thoroughly explored. The exact cause remains to be determined.

(*b*) *Control by means of vaccines.*—A number of different types of vaccine have been made and are in use. These include the Maryland station's hamster "rodent" adapted strains, strains passed through birds other than chickens, and the Virginia station's strain of low virulence "B_1" which is used intranasally in poultry. This latter vaccine is intriguing not only because of its low infectivity but also because it may be used in a spray which has unlimited possibilities in large-scale handling of chicks and should effect savings in labor and other ex-

penses. By this method boxes of chicks may be treated with the B_1 vaccine in a short time with safety. Preliminary research at the Massachusetts and Texas stations support results obtained at the Virginia station.

Many problems remain to be solved.—The question may be raised as to why studies should be continued on Newcastle disease when vaccines are at hand for controlling it. The ideal vaccine, which produces a strong and lasting immunity without upsetting the birds and does not constitute a danger to unvaccinated birds, is yet to be found and only by continuous and painstaking research will it be discovered. Also, it is recognized that the use of living Newcastle vaccine will not end the threat of the disease and will not eradicate it. There is no example in the history of human or veterinary medicine of a vaccine that alone has eliminated disease.

Another reason for continuing these cooperative studies is the fact that other respiratory diseases of poultry are apparently on the increase. They often cause trouble in Newcastle vaccinated flocks and produce symptoms so similar to Newcastle disease that farmers feel they are suffering an "outbreak" and blame it on the vaccine. These diseases are now receiving intensive study under a revised program.

The experiment stations cooperating in these studies are: California, Storrs (Connecticut), Delaware, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York (Cornell), North Dakota, Ohio, Rhode Island, South Dakota, Texas, Virginia, West Virginia, and Wisconsin.

2. New plants offer promise of better agriculture

An important segment of the regional research program is directed to the discovery, introduction, and breeding of new and useful agricultural plants, and the improvement of plants now under cultivation through the introduction of new germ plasm. The work involves close teamwork between the four regional groups of State experiment stations and the Department. The Division of Plant Exploration and Introduction of the Bureau of Plant Industry, Soils, and Agricultural Engineering has major responsibility for the discovery and introduction phase, while the States take the lead in growing the introductions, testing them for adaptation and possible value, increasing and maintaining stocks of seeds or other propagating material, and distributing them to plant breeders for use in their work of breeding better crop plants.

Organization of the work.—According to plan, each region is expected to establish and maintain a primary plant introduction station where plant introductions thought to have possibilities for the region are screened and given preliminary evaluation. Further testing and evaluating is done by experiment stations of the region with materials of special interest and adaptation to their local climate and soil conditions.

The primary station for the north-central region is at Ames, Iowa, on land made available by the Iowa Agricultural Experiment Station. The Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, and South Dakota stations cooperate in screening and evaluating plant materials which can be grown to best advantage by them. Also, in the north-central region is the interregional potato introduction station at Sturgeon Bay, Wis. Here stocks of many varieties of potatoes and related wild species of Solanum are screened and made available to breeders everywhere for the development of improved varieties of potatoes.

There are now more than 5,700 accessions of new plants in the hands of research workers in the north-central region for screening and evaluating, including many accessions of domestic and wild species of tomatoes at the Ohio station, which serves as a national as well as regional center for this crop.

Similarly, the primary station for the southern region is maintained on 20 acres of land at Experiment, Ga., made available by the Georgia station. All States in the region are participating in the program of screening and evaluating the 5,900 numbers distributed to date. New plants for industrial uses as oil and fiber crops are emphasized in the program, which also includes forage and pasture grasses and legumes and soil improvement crops, and the major field and vegetable crops of the region.

In the western region, the primary station has just been established on land made available by the Washington station at Pullman. Introductions of a wide variety of field crops, vegetables, fruits, oil crops, and forage and range plants are under test at the cooperating stations. Local explorations and screening by the New Mexico station has revealed four native plants that have promise for oil production.

Introductions of particular interest to the stations of the northeastern region are distributed through the Department's plant introduction station at Glenn Dale, Md. A great deal of valuable work is under way in the area and this will be intensified when funds become available for a primary station.

Promising new plant materials.—Among the many accessions which offer promise of great enrichment to American agriculture, the following are cited as examples: Seed of *Martinia parviflora*, a native plant under trial at the New Mexico station, have yielded 30 percent of oil by the press method. The oil has semi-drying properties, a pale-yellow color, and a mild and bland flavor. The seeds can be threshed satisfactorily with a slightly modified teeth-type thresher. Results to date show promise of a new oil producing crop for the dry areas of the Southwest.

An alfalfa introduction from Arabia offers promise as a source of resistance to the yellows disease. It showed no yellowing from leaf-hopper injury when adjacent plants were severely injured.

A pea from Peru, reported to be resistant to mildew, proved excellent in quality and produced twice the yield of any of the other 140 introductions under observation.

A species of bromegrass appears to have disease resistance in addition to winter hardiness and good forage characteristics.

Among the stocks maintained at the potato introduction station are three wild Mexican species completely immune to all known strains of the late blight fungus, scab immune species, several wild species with resistance to one or more of three important virus diseases, and wild potatoes with high resistance to nematodes. Some of these immunities have been bred into commercial varieties of potatoes now in large-scale production. Others offer promise for the future.

An early sweet corn discovered in New England that matures in 65 days is now being used in breeding work by several stations of the area.

A squash selection of highest cooking quality is promising for the improvement of canning types of squash.

3. Marketing livestock in the South.

Ten experiment stations in the southern region and the Department are cooperating in a livestock-marketing study, the results of which are expected to serve as a guide to more efficient marketing of meat and meat animals produced in the region. As a basis for making determinations, over 10,000 farmsteads were visited and schedules taken regarding the type, quality, and market class of livestock marketed, the agencies used, relative prices received, and the seasonality of marketings. Findings were summarized and are to be published in a regional bulletin.

Results indicate that livestock auction markets are by far the most important outlet for southern livestock both in terms of the number of livestock sold and the number of farmers patronizing them. Marketings of cattle and hogs were largest during the fall and early winter months, whereas most lambs were marketed in the late spring or early summer. Farmers tend to choose market outlets mostly for convenience but a large proportion also felt that they received the highest prices at auction markets even though few auctions sell livestock on the basis of grade. Many livestock producers felt that no present source of market news provided adequate information to serve as a basis for choosing the best market outlet for their livestock.

In Virginia, major study has been directed to determining price-grade differentials paid for feeder calves and yearling steers. Prices by grades were obtained from sales in which 2,182 yearling steers were sold. Fancy and choice steers averaged about 5 percent higher than good grade steers, while prices paid for medium grades averaged about 5 percent lower than prices received for good steers. A comparison of the prices paid for good grade calves and good grade yearling steers of the same breed, and on the same date, showed that feeder calves averaged $6 per hundred weight higher than feeder steers. Tennessee and South Carolina, in studying price-grade differentials for hogs on southern markets, found that price-grade relationships existing on most large terminal markets were not maintained in State markets.

In making an analysis of meat distribution and consumption in the Baton Rouge area, the Louisiana station learned that the per capita consumption of meat in Baton Rouge for the year 1949 exceeded the United States average, and was characterized by the relatively large quantities of veal and baby beef consumed and small quantities of heavy beef, lamb, and mutton purchased. Progress is being

made by the Mississippi station in developing a methodology for studying the scale of operations in meat-processing plants. Work on all phases of the regional project will continue to supply further needed detailed information to serve as a basis for developing definite conclusions and recommendations to livestock producers in the South to insure increased efficiency in the marketing of their products.

4. Breeding better poultry

In the north-central region 66 inbred lines of chickens are being developed at 11 State stations These cover most of the popular breeds. Thirty-three of the inbred lines have been evaluated for ability to combine, by means of topcrosses carried at the Central Testing Station maintained at the Indiana station. Some of the topcrosses (inbred males mated with noninbred Rhode Island Reds and White Leghorns) are superior in performance to either the purebreds or hybrids carried at the testing station. Thus far the results indicate that certain topcross combinations may have commercial possibilities. Some of the commercial hybirds proved better than any purebred carried.

The Iowa station is working with a recently imported Egyptian chicken, which is exceptionally hardy and comparatively free of leucosis, especially the neural type. A pure strain is being developed which has yellow shanks and skin, and a columbian plumage pattern, and it is being crossed with other breeds in order to combine the good qualities of those involved.

During a period of 5 years, the North Dakota station has reduced losses from leucosis in the station flock from 32 to 13 percent through selective breeding. On the other hand, in an unselected line from the same stock and for the same period mortality has continued to be very high.

In the southern region, the New Hampshire and White Plymouth Rock breeds are most widely used at the cooperating stations for development of high-quality broiler stock, although some research is being conducted on the Cornish varieties also.

Work at the Alabama station on resistance of strains to coccidiosis shows a high degree of heritability of this quality. This year mortality from coccidiosis among artificially infected, fifth-generation-resistant chicks was 27 percent that of the controls, as compared to 62 percent at the beginning of the investigation. These results indicate that considerable resistance to coccidiosis may be obtained in a few generations.

The Arkansas station has found that chickens, both purebreds and crossbreeds, at 9 and 11 weeks of age gain weight as fast and efficiently when the sexes are produced together as when produced separately. There is no indication that separation of sexes has any influence on U. S. Dressed grade at 11 weeks of age.

An endeavor to combine ideal broiler characteristics, such as fast feathering, rapid growth, and wide breast, with good reproductive qualities, is being made at the South Carolina station using purebred New Hampshires and White Plymouth Rocks. The broiler qualities of the South Carolina stock were only slightly below those of a high-rating "chicken of tomorrow" strain of White Plymouth Rocks.

In a fundamental study on blood antigens in various strains and breeds of chickens, the Texas station has discovered two new blood-group loci (locations of genes on a chromosome) in addition to the two previously known. The blood groups are proving to be an effective method of identifying pedigrees, especially in distinguishing the members of inbred lines which are otherwise alike in all readily apparent characteristics. Evidence obtained as to the behavior of one of the blood-group loci in breeding experiments indicates that it may be possible to inbreed more intensively than at present without affecting fecundity.

The western region is concerned primarily with turkey improvement. At the Washington station the heat preconditioning of turkey toms increased their fertilizing ability and the hatchability of eggs sired by them. Hens maintained at 65° F. showed greater tendency toward broodiness which resulted in lower egg production. Heat-preconditioned males mated to nonheated females produced 20 percent more fertile eggs than nonpreconditioned males. There was an apparent, clear-cut effect of environmental temperature on the number of spermatozoa produced by a tom.

Initiation and completion of regional research projects.—Within the 5 years since the allotments under section 9 have been available, 89 cooperative regional projects have been initiated as shown below:

TABLE D.—*Regional research projects*

Fiscal year	Projects started	Projects completed	Total active projects
1948	52		52
1949	3		55
1950	18	3	70
1951	5	5	70
1952	1	2	69
1953	10	4	75
Total	89	14	75

In addition to the 14 projects that have been completed, specific phases of other projects have been completed and the objectives and procedures of a number of regional projects have been revised.

Mr. ANDERSEN. Dr. Elting, we will welcome a general statement from you relative to the work of the Office of Experiment Stations.

GENERAL STATEMENT

Dr. ELTING. Thank you, Mr. Chairman. The Office of Experiment Stations appears this morning to discuss with the committee four items in the estimates, the most important of which is the item pertaining to payments to States for the support of research at State agricultural experiment stations. We have also our regular salaries and expense item which provides the major funds for the support of our Washington office and also for support of the Federal experiment station in Puerto Rico. The third item concerns the program of agricultural research and extension in the Virgin Islands; and the fourth item is one which heretofore has appeared in the budget of the Research Administrator but which by understanding between Dr. Shaw and this committee will now appear in our budget. That is the item on research on agricultural problems in Alaska.

Mr. ANDERSEN. Doctor, would you first give to the committee a short résumé of the responsibilities of your organization? We have three new members on this subcommittee and I would like you to give, for their sake as well as for the record, a very short summation of your responsibilities.

OFFICE OF EXPERIMENT STATIONS RESPONSIBILITIES

Dr. ELTING. Yes, sir; we will be glad to do that. The brief summary sheet which we have placed before you indicates broadly the provisions of the several acts providing payments to States for research at the State agricultural experiment stations. The Office of Experiment Stations has, since 1888, represented the Secretary of Agriculture in the administration of these Federal grants. The functions of the Office, being prescribed by law, provide that these funds shall be administered strictly for the purposes specified in the acts which outline the general types of research authorized. The law further provides that there shall be annual ascertainment that the funds have been appropriately used and that the Office shall coordinate the research of the several experiment stations which are the beneficiaries of these funds and also the activities between the State Agricultural Experiment Stations and the research agencies of the Department engaged in similar lines of research.

Mr. ANDERSEN. I think, Doctor, that explains the primary functions of your group.

Now, at this point, I wish you would place in the record your legislative authority and indicate which functions are mandatory and which are permissive.

(The data requested is as follows:)

LEGAL AUTHORITY OF THE SECRETARY OF AGRICULTURE IN THE ADMINISTRATION OF THE FEDERAL-GRANT ACTS FOR AGRICULTURAL RESEARCH AT THE STATE AGRICULTURAL EXPERIMENT STATIONS AND THE DELEGATION OF AUTHORITY TO THE OFFICE OF EXPERIMENT STATIONS BY THE SECRETARY OF AGRICULTURE FOR CARRYING OUT THIS ADMINISTRATIVE RESPONSIBILITY

The legal authority and responsibility of the Secretary of Agriculture in the administration of the Federal-grant acts is set forth in different sections of the individual acts. Beyond the specific authority conveyed to the Secretary in the several acts, there has been set forth from time to time in various Department of Agriculture appropriation acts authority and responsibility relating to the effective administration of these acts. In the following summary there will be presented the major statements of the authority and responsibility of the Secretary of Agriculture in the administration of the Federal-grant acts as presented in the provisions of the individual Federal-grant-fund acts. The second part of the summary will deal with the establishment of the Office of Experiment Stations and the delegation of authority by the Secretary of Agriculture to the Office of Experiment Stations for the administration of the provisions of the acts and the subsequent administrative requirements as set forth in the various Department of Agriculture appropriation acts.

As indicated by the following documentation, each of the prescribed functions of the Office of Experiment Stations is mandatory.

A. HATCH ACT

Act of 1887 Establishing Agricultural Experiment Stations

SEC. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States Commissioner [now Secretary] of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigations or experiments; to indicate from time to time such lines of inquiry as to him shall seem most important, and, in general, to furnish such advice and assistance as will best promote the purpose of this act. It shall be the duty of each of said stations annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner [now Secretary] of Agriculture, and to the Secretary of the Treasury of the United States.

B. ADAMS ACT

Act of 1906 for the Further Endowment of Agricultural Experiment Stations

SEC. 4. That on or before the first day of July in each year after the passage of this act the Secretary of Agriculture shall ascertain and certify to the Secretary of the Treasury as to each State and Territory whether it is complying with the provisions of this act and is entitled to receive its share of the annual appropriation for agricultural experiment stations under this act and the amount which thereupon each is entitled, respectively, to receive. If the Secretary of Agriculture shall withhold a certificate from any State or Territory of its appropriation, the facts and reasons therefor shall be reported to the President, and the amount involved shall be kept separate in the Treasury until the close of the next Congress, in order that the State or Territory may, if it shall so desire, appeal to Congress from the determination of the Secretary of Agriculture. If the next Congress shall not direct such sum to be paid, it shall be covered into the Treasury; and the Secretary of Agriculture is hereby charged with the proper administration of this law.

SEC. 5. That the Secretary of Agriculture shall make an annual report to Congress on the receipts and expenditures and work of the agricultural experiment stations in all of the States and Territories, and also whether the appropriation of any State or Territory has been withheld; and if so, the reason therefor.

C. PURNELL ACT

Act of 1925 for the More Complete Endowment of the Agricultural Experiment Stations

SEC. 4. That on or before the 1st day of July in each year after the passage of this act the Secretary of Agriculture shall ascertain and certify to the Secretary of the Treasury as to each State and Territory whether it is complying with the provisions of this act and is entitled to receive its share of the annual appropriations for agricultural experiment stations under this act and the amount which thereupon each is entitled, respectively, to receive. If the Secretary of Agriculture shall withhold from any State or Territory a certificate of its appropriation, the facts and reasons therefor shall be reported to the President and the amount involved shall be kept separate in the Treasury until the close of the next Congress in order that the State or Territory may, if it shall so desire, appeal to Congress from the determination of the Secretary of Agriculture. If the next Congress shall not direct such sum to be paid, it shall be covered into the Treasury. The Secretary of Agriculture is hereby charged with the proper administration of this law.

SEC. 5. That the Secretary of Agriculture shall make an annual report to Congress on the receipts and expenditures and work of the agricultural experiment stations in all of the States and Territories, and also whether the appropriation of any State or Territory has been withheld; and if so, the reason therefor.

D. BANKHEAD JONES ACT (TITLE I)

(1) Act of 1935 Providing for Agricultural Research, Further Development of Cooperative Agricultural Extension Work, and More Complete Endowment and Support of Land-Grant Colleges.

SEC. 2. The Secretary is also authorized and directed to encourage research similar to that authorized under section 1 to be conducted by agricultural experiment stations established or which may hereiafter be establshed in pursuance of the act of March 2, 1887, providing for experiment stations, as amended and supplemented, by the allotment and payment as provided in section 5 to Puerto Rico and the States and Territories for the use of such experiment stations of sums appropriated therefor pursuant to this title.

SEC. 5. (a) Sixty per centum of the sums appropriated for any fiscal year under section 3 shall be available for the purposes of section 2. The Secretary shall allot, for each fiscal year for which an appropriation is made, to Puerto Rico and each State and Territory an amount which bears the same ratio to the total amount to be allotted as the rural population of Puerto Rico or the State or Territory bears to the rural population of Puerto Rico and all the States and Territories as determined by the last preceding decennial census. No allotment and no payment under any allotment shall be made for any fiscal year in excess of the amount which Puerto Rico or the State or Territory makes available for such fiscal year out of its own funds for research and for the establishment and maintenance of necessary facilities for the prosecution of such research. If Puerto Rico or any State or Territory fails to make available for such purposes for any fiscal year a sum equal to the total amount to which it may be entitled for such year, the remainder of such amount shall be withheld by the Secretary. The total amount so withheld may be allotted by the Secretary of Agriculture to Puerto Rico and the States and Territories which make available for such year an amount equal to that part of the total amount withheld which may be allotted to them by the Secretary of Agriculture, but no such additional allotment to Puerto Rico or any State or Territory shall exceed the original allotment to Puerto Rico or such State or Territory for that year by more than 20 per centum thereof.

(b) The sums authorized to be allotted to Puerto Rico and the States and Territories shall be paid annually in quarterly payments on July 1, October 1, January 1, and April 1. Such sums shall be paid by the Secretary of the Treasury upon warrant of the Secretary of Agriculture in the same manner and subject to the same administrative procedure set forth in the act of March 2, 1887, as amended June 7, 1888.

SEC. 6. As used in this title the term "Territory" means Alaska and Hawaii.

SEC. 7. The Secretary of Agriculture is authorized and directed to prescribe such rules and regulations as may be necessary to carry out this act.

(2) Amendment of the Bankhead-Jones Act and the Agricultural Marketing Act of 1946

Title I of the act entitled "An act to provide for research into basic laws and principles relating to agriculture and to provide for the further development of cooperative agricultural extension work and the more complete endowment and support of land-grant colleges," approved June 29, 1935 (the Bankhead-Jones Act).

SEC. 9. (b) * * *

(3) Not more than 25 per centum of the sums appropriated for any fiscal year under this section shall be allotted to the States for cooperative research in which two or more State agricultural experiment stations are cooperating to solve problems that concern the agriculture of more than one State. The funds available for such purposes shall be designated as the "Regional research fund, Office of Experiment Stations" and shall be used only for cooperative regional projects recommended by a committee of nine persons elected by and representing the directors of the State agricultural experiment stations and approved by the Secretary of Agriculture or his authorized representative. The necessary travel expense of said committee of nine in performance of their duties may be paid from the regional research fund, Office of Experiment Stations, provided for under this subsection.

(c) Three per centum of the sums appropriated for any fiscal year under this section shall be available to the Office of Experiment Stations of the United States Department of Agriculture for administration of research under this section, including participation in planning and coordinating the cooperative regional research.

* * * * * * *

SEC. 11. Notwithstanding any other provision of this title, (1) not less than 20 per centum of the funds authorized to be appropriated under section 9 (*a*) shall be used by State agricultural experiment stations for conducting marketing research projects approved by the Department of Agriculture, and (2) cooperative research projects provided for under sections 9 (*b*) (3) and 10 (*b*) shall be carried out under cooperative agreements between the Secretary of Agriculture and the cooperating agencies and shall include appropriate provisions for preventing duplication or overlapping of work within the State or States cooperating. Should duplication or overlapping occur subsequent to approval of a cooperative research project, the Secretary of Agriculture is authorized and directed to withhold unexpended balances on such projects notwithstanding the prior approval thereof. The Secretary of Agriculture shall include in his annual report to Congress a complete statement of research work being performed under contracts or cooperative agreements under this title, showing the names of the agencies cooperating and the amounts expended thereon, segregated by Federal and non-Federal funds.

E. AGRICULTURAL MARKETING ACT

SEC. 204. * * *

(b) The Secretary of Agriculture is authorized to make available from such funds such sums as he may deem appropriate for allotment to State departments of agriculture, State bureaus and departments of markets, State agricultural experiment stations, and other appropriate State agencies for cooperative projects in marketing service and in marketing research to effectuate the purposes of title II of this Act: *Provided*, That no such allotment and no payment under any such allotment shall be made for any fiscal year to any State agency in excess of the amount which such State agency makes available out of its own funds for such research. The funds which State agencies are required to make available in order to qualify for such an allotment shall be in addition to any funds now available to such agencies for marketing services and for marketing research. The allotments authorized under this section shall be made to the agency or agencies best equipped and qualified to conduct the specific project to be undertaken. Such allotments shall be covered by cooperative agreements between the Secretary of Agriculture and the cooperating agency and shall include appropriate provisions for preventing duplication or overlapping of work within the State or States cooperating. Should duplication or overlapping occur subsequent to approval of a cooperative project or allotment of funds, the Secretary of Agriculture is authorized and directed to withhold unexpended balances on such projects notwithstanding the prior approval thereof.

Delegation of Authority and Responsibility to the Office of Experiment Stations in Connection With the Administration of the Federal-Grant Acts for Agricultural Research

A. ESTABLISHMENT AND PURPOSE

The following quotation from a historical sketch of the Department of Agriculture explains the origin and purpose of the Office of Experiment Stations:

"Hon. Norman J. Colman of Missouri was appointed Commissioner [of Agriculture] by President Cleveland and took his place on April 3, 1885. * * * Mr. Colman took a deep interest in the plan being pushed at this time by Representative Hatch for the establishment of agricultural experiment stations in all the States. He called a meeting of the leading men of the agricultural colleges and existing experiment stations, at which the need of Federal aid for experiments and a central office in the Department with advisory duties, was made prominent. In accordance with the opinions expressed at this convention the Hatch bill, which became a law in 1887, made it a part of the duty of the Commissioner of Agriculture 'to furnish forms for the tabulation of results of investigations or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act.'

"For this purpose an office was established, known in the Department as the Office of Experiment Stations, under a chief who is styled 'director.' The publication of a periodical, such as the present Experiment Station Record, was recommended." (In Historical Sketch of the U. S. Department of Agriculture, Bul. 3, rev., 1898, pp. 18, 19.)

The Office of Experiment Stations was established by Commissioner Colman October 1, 1888.

The first volume of Experiment Station Record was submitted for publication September 2, 1889, with a letter of transmittal, approved by the Secretary of Agriculture, Hon. J. M. Rusk, which read in part as follows:

"In accordance with the acts of Congress and the directions of the Secretary of Agriculture in conformity therewith, it is the duty of this office not only to indicate lines of inquiry and furnish such advice and assistance as will best promote the objects for which the agricultural experiment stations are established, but also to 'compare, edit, and publish such results' of their work as may be deemed necessary.

"There is a very general demand for brief accounts of the current work of the experiment stations and kindred institutions in this country. To make such a current record more serviceable it should be published regularly and as promptly as practicable."

President Cleveland in his second annual message, December 3, 1894, reported to Congress that:

"In obedience to this law [Hatch Act], the Department of Agriculture immediately sent out blank forms of expense accounts to each station, and proposes in addition to make, through trusted experts, systematic examination of the several stations during each year for the purpose of acquiring by personal investigation the detailed information necessary to enable the Secretary of Agriculture to make, as the statute provides, a satisfactory report to Congress." (Institute of Government Research, Service Monograph, U. S. Government 32, 1924, p. 58.)

As later Federal-grant acts authorizing increased funds for research at the State agricultural experiment stations were enacted, authority for administration of these acts was delegated to the Office of Experiment Stations by the Secretary of Agriculture.

The appropriation acts for the Department of Agriculture for fiscal year 1895 and for each year since that date have granted the Secretary of Agriculture authority to prescribe the form of the annual financial statement required by section 3 of the Hatch Act and responsibility for ascertainment that expenditures by the State stations are in accordance with the provisions of the basic acts. Authority of the Office of Experiment Stations to coordinate work of the State agricultural experiment stations with work of the Department of Agriculture was first included in the Department of Agriculture Appropriation Act for fiscal year 1916. It has been included in all subsequent annual appropriation acts. The language covering these authorities and responsibilities as included in the Department of Agriculture Appropriation Act for the fiscal year 1953 is as follows:

SALARIES AND EXPENSES

For necessary expenses in connection with administration of grants and coordination of research with States pursuant to the acts approved March 2, 1887, March 16, 1906, February 24, 1925, May 16, 1928, February 23, 1929, March 4, 1931, and June 20, 1936, and acts amendatory thereto (7 U. S. C. 361–363, 365–383, 386–386f), and title I of the act approved June 29, 1935, as amended by the act of September 21, 1944 (7 U. S. C. 427–427g), and for the administration, operation, and maintenance of an agricultural experiment station in Puerto Rico, $380,009; and the Secretary shall prescribe the form of the annual financial statement required under the above acts, ascertain whether the expenditures are in accordance with their provisions, coordinate the research work of the State agricultural colleges and experiment stations in the lines authorized in said acts with research of the Department in similar lines, and make report thereon to Congress.

It will be noted that the above language includes authority for administration, operation, and maintenance of the Federal Experiment Station in Puerto Rico. Authority has also been delegated to this Office by the Secretary of Agriculture and the Agricultural Research Administrator to administer the Virgin Islands agricultural research and extension program authorized by Public Law 228, approved October 29, 1951. In addition, responsibility for administration of the Alaska Experiment Station is being delegated to the Office of Experiment Stations by the Agricultural Research Administrator. It is for this reason that the appropriation item "Research on agricultural problems of Alaska" is transferred in the 1954 estimates to the Office of Experiment Stations from the Office of the Research Administrator.

SCOPE OF PROGRAM

Dr. ELTING. Now, with that broad outline of responsibilities, I would like to make a general statement on the progress and accomplishments of the experiment station program and then proceed to such questioning of the estimates as the committee may desire.

Dr. Shaw has recently discussed with this committee the overall importance of a dynamic and expanding program of agricultural research in the Nation and when we speak of agricultural research we think always jointly in terms of the activities of the United States Department of Agriculture and the State agricultural experiment stations which together constitute the main agricultural research structure in this Nation. It is a rather complex structure since it deals with 51 autonomous State and Territorial institutions and the Federal Department. Yet, it is a well integrated structure the key to which is cooperative effort, a type of cooperation that has evolved over years of working together. It is very difficult in a brief time to present a comprehensive picture of the activities of the experiment stations since they extend actually to every important type of farming area in the States and Territories and in Puerto Rico, and within the limits of the facilities of the stations they are attempting to solve problems that affect farmers in every important farming area.

A few statistics may help to indicate the scope of this program. It was in 1952, a program on which $69 million was expended, this total support was derived to the extent of about $12½ million of Federal grant funds and about $57 million representing non-Federal funds, largely State appropriations and other funds of non-Federal origin. So that in 1952 the States provided $4.42 for each dollar of Federal funds as provided for research in the State experiment stations. There was employed last year a total of 7,270 research workers. Approximately half of this number devoted full time to research, the remainder dividing their time between research and teaching or extension work in the land-grant colleges.

Mr. ANDERSEN. If you will pardon an interjection, Doctor. It is interesting to notice that from year to year the contributions made by the various States to this work seem to be increasing in relation to Federal contributions.

Dr. ELTING. That is true, and if you will turn to the second page of the material I placed before you, the curve——

Mr. ANDERSEN. I was studying that curve. It seems to be along the right trend.

Dr. ELTING. We feel that has been a very significant development. It has been particularly marked in the past 10 years.

Mr. ANDERSEN. And this in itself indicates the fine support given by the various States to this work.

Dr. ELTING. To me, that is the most eloquent evidence we have of the appreciation of the importance of a strong agricultural research program.

RESEARCH ACCOMPLISHMENTS

We have placed in the notes a number of examples of research accomplishments which are typical, I believe, of the various types of material which is being reported out of the experiment stations indicating their findings. Some of these are very practical and immediately applicable types of findings which through extension and other outlets are rapidly finding their way into practice on the farm. Others are of the more fundamental type which do expand our total knowledge in the field and which eventually will form the basis for practice, although as they are now reported, they simply help to explain certain phenomena which we observe and which makes it much easier then to approach some of the applied problems.

The volume of research reported is very substantial as indicated in the numbers of publications. Last year, there emanated from the experiment stations 797 bulletins and circulars, 4,600 articles in technical journals, some 276 pamphlets and leaflets, over 1,300 processed publications, and in addition, 27 of the State stations issue a regular research periodical which has become a very effective medium for disseminating progress reports and timely findings. In all, that represents approximately 80,000 pages of printed material from the experiment stations in a single year. That is not an end in itself, but it is some indication of the volume of work that is being accomplished year by year. We could go on with many examples. We would be glad to discuss any particular field in which the committee might have a particular interest but unless you wish us to pursue that point further, Mr. Chairman, I believe it would be more significant to describe the general growth of the program.

Mr. ANDERSEN. Yes, Doctor, I wish that as you go along you would give a short analysis of each of the five major acts under your purview.

Dr. ELTING. Yes, sir.

Mr. ANDERSEN. A short description for the record. I refer to the table you have on page 1 here.

PROVISIONS OF FEDERAL GRANT ACTS

HATCH ACT

Dr. ELTING. The program which we are discussing is covered under 5 different basic acts. The parent act is the Hatch Act of 1887 which provided that there should be established in each of the State

land-grant colleges a department to be known as an agricultural experiment station. Within two or three years after the passage of that act, every State had taken advantage of this authorization and had established an agricultural experiment station. That act provided that each State should receive $15,000 annually in Federal appropriations for the partial support of agricultural research in the State. That sum has been appropriated annually without exception.

ADAMS ACT

In 1906, there was a supplementary act known as the Adams Act which further extended the opportunities for research and provided an additional $15,000 annually for each State. Over the succeeding years, the States substantially increased their contributions so that by 1925 there was being appropriated through State and Federal sources around $9 million annually.

PURNELL ACT

At that time, the third Federal act was passed known as the Purnell Act which provided $60,000 annually to each State. It also somewhat broadened the authorization for types of research since for the first time it authorized research in economics and the social sciences. It really marked the beginning of a substantial program of agricultural economics which up to that time had received relatively little attention.

BANKHEAD-JONES ACT

Ten years later, in 1935, the Bankhead-Jones Act was passed, one section of which, section 5, provided an additional $3 million to be appropriated annually. This fund was not to be distributed in equal amounts but rather was to be distributed by formula based on the relative rural population in the several States, and it further required that each State should provide an equal sum of money from their own sources—in other words, a matching requirement which did not exist under the three preceding acts.

In 1946 an amendment to the Bankhead-Jones Act was passed adding sections 9 and 11 and providing an authorization for an additional $20 million annually again to be distributed by formula, a more complex formula than we had under the original Bankhead-Jones Act. It provided 20 percent in equal amounts to each State, 26 percent on the basis of relative rural population, 26 percent on the basis of relative farm population, 25 percent to be set aside as a regional research fund and 3 percent to be available for administration of the act.

There has been appropriated under that authorization $5 million during each of the past 4 years.

At this time also I would like to mention two or three of the provisions of the amended Bankhead-Jones Act which representated new provisions in grant fund legislation that I believe will interest this committee. That act provided that during the first 5 years of activity, funds might be carried over from one fiscal year to the next and remain available for expenditure. That provision proved very useful and helpful in the early years from 1948 to 1950, particularly at a time when the colleges were heavily burdened with students under the GI bill and when personnel was somewhat of a bottleneck in our program.

It permitted an orderly growth and development and was very helpful. That provision has now expired as of last July 1; the carryover provision no longer is available so that now any unexpended balances remaining at the end of any fiscal year are treated as a deduction against the succeeding year's appropriation. In other words, no State now shall have a larger amount of funds than is actually provided by appropriation during that fiscal year.

Another new feature of this amendment was the requirement that 20 percent of the funds appropriated be expended for marketing research. During the first 5 years the States actually expended 28.8 percent of the total appropriation for marketing research, and it marked during that 5-year period a very definite expansion in marketing research, which I am sure reflects the accomplishment that the Congress intended when that provision was included.

PROVISION FOR REGIONAL RESEARCH

Another new feature of the act was the provision for a regional research fund which has had a very marked impact on our cooperative regional approach to problems that affect two or more States. Last year, I explained to this committee in some detail the organization which has been developed among the experiment stations for dealing with the planning and conduct of regional research. It is interesting to note that while 25 percent of the total fund is set aside as a regional fund, there actually has been attracted to the support of regional research considerable sums of the other funds available to the experiment stations so that last year we actually expended something over 8 percent of the total Federal grant and non-Federal funds available to the stations for the support of regional research.

In our judgment, this provision of the act is becoming one of the most important media for coordination of effort among the States that has been introduced into the program. Through the creation of technical committees in special subject matter areas it has permitted an exchange of ideas and a joint planning on many problems that is very effective in coordinating activities and in preventing duplication of effort. So we feel that the impact of this goes far beyond the actual number of projects that are receiving financial support through this source.

REDISTRIBUTION OF FUNDS

One other item in which the committee has expressed interest for the past 2 years is the redistribution of the funds under both sections 5 and 9 of the Bankhead-Jones Act, since it is provided that those funds shall be redistributed on the basis of the latest decennial census. You will recall in 1952 we had the rural population data for 1950 but did not have the farm population data, so that our adjustment was only partial during fiscal year 1952. We now have the final data both on rural and farm population, and the table which we have just handed you now reflects the total shifts in funds as a result of the 1950 census. You will note that there is a total of $195,000 involved in these shifts and that a few States were rather sharply affected, although in the great majority of cases the impact was sums less than $5,000.

Mr. ANDERSEN. Doctor, just what was the primary reason for the sharp decrease in a few of these States? Was that caused by the fact that they are shifting from rural to industrial population?

Dr. ELTING. Undoubtedly it is, sir. It certainly represents shifts in population. You will note that Texas and Oklahoma are the two States most sharply affected. It undoubtedly reflects a number of things; perhaps the mechanization of cotton production being one of the most significant facts, but also a general decline in actual farm population. I say "actual"—at least relative to the farm population in other States.

CHANGE IN DEFINITION OF URBAN AND RURAL POPULATION

Mr. WHITTEN. Mr. Chairman, could I interrupt there? That situation undoubtedly prevails, but I understand the major cause of the shift of funds was a change in the definition of farm and rural population by the Census Bureau. What justification, if any, was there for changing the definition for rural population? The action of the Census Bureau, so I am told, exaggerated the shift by changing the definition. Has any explanation been given of that?

Dr. ELTING. I can't answer as to why the changes in definition were made. I do know that that is true and that it particularly affected fringe areas around cities. Much of the area there which at one time had been defined as rural population was blanketed in as urban population during the last census.

Mr. ANDERSEN. Will you describe just exactly what those changes in definition were.

Dr. ELTING. To the best of my knowledge, sir, the change applied largely to metropolitan areas where concentrations of population such as would exist in Montgomery and Prince Georges Counties here previously had been classified as rural, but in the changed definition were in the 1950 census classified as urban population.

Mr. ANDERSEN. Just how did the Census Bureau change the definition; what was the wording of it?

Dr. ELTING. I do not have that available. I would have to insert that in the record.

(The old and the new definitions are as follows:)

DEFINITION OF URBAN AND RURAL POPULATION

According to the new definition that was adopted for use in the 1950 census, the urban population comprises all persons living in (*a*) places of 2,500 inhabitants or more incorporated as cities, boroughs, and villages, (*b*) incorporated towns of 2,500 inhabitants or more except in New England, New York, and Wisconsin, where towns are simply minor civil divisions of counties, (*c*) the densely settled urban fringe, including both incorporated and unincorporated areas, around cities of 50,000 or more, and (*d*) unincorporated places of 2,500 inhabitants or more outside any urban fringe. The remaining population is classified as rural According to the old definition, the urban population had been limited to all persons living in incorporated places of 2,500 inhabitants or more and in areas (usually minor civil divisions) classified as urban under special rules relating to population size and density.

In both definitions, the most important component of the urban territory is the group of incorporated places having 2,500 inhabitants or more. A definition of urban territory restricted to such places would exclude a number of equally large and densely settled places, merely because they were not incorporated places. Under the old definition, an effort was made to avoid some of the more obvious omissions by the inclusion of the places classified as urban under special rules. Even with these rules, however, many large and closely builtup places were excluded from the urban territory. To improve the situation in the 1950 census, the Bureau of the Census set up, in advance of enumeration, boundaries for urban-fringe areas around cities of 50,000 or more and for unincorporated places

outside urban fringes. All the population residing in urban-fringe areas and in unincorporated places of 2,500 or more is classified as urban according to the 1950 definition. (Of course, the incorporated places of 2,500 or more in these fringes are urban in their own right.) Consequently, the special rules of the old definition are no longer necessary. For the convenience of those who are interested in the trend of the urban and rural population, the 1950 population is shown in accordance with the old definition as well as in accordance with the 1950 definition. Although the Bureau of the Census has employed other definitions in the course of its history, the statistics on the population by urban and rural residence shown for years prior to 1940 are in substantial accordance with the 1940 definition.

The count of urban places according to the new urban definition includes all incorporated places of 2,500 or more regardless of location and unincorporated places of 2,500 or more. Incorporated places of fewer than 2,500 inhabitants which lie in the urban fringe are not recognized as urban places even though their population is counted as urban. Under the old definition, all incorporated places of 2,500 inhabitants or more and all areas classified as urban under special rules were recognized as urban places. Thus, although the urban population under the old definition was exactly the population living in urban places, the urban population under the new definition includes persons living in territory outside of urban places, that is, in incorporated places under 2,500 and unincorporated territory included in the urban-fringe areas.

Included in the urban population according to the 1950 definition were 6,203,596 persons living in urban-fringe areas and 1,674,223 persons living in unincorporated places of 2,500 inhabitants or more who would have been included in the rural population under the old definition. On the other hand, 337,597 persons living in areas urban under special rules according to the old definition were classified as rural according to the new definition. The net difference in the urban population which resulted from the change in definition, therefore, is 7,540,222, or 5 percent of the total population of the United States. In terms of the population classified in accordance with the old urban definition, the change in definition resulted in an increase of 8.5 percent in the urban population and a decrease of 12.2 percent in the rural population.

The population of the incorporated places of 2,500 inhabitants or more constituted 89.7 percent of the urban population under the new definition and 97.3 percent of the urban population under the old definition. The population living in other territory in the urban-fringe areas accounted for 8.2 percent of the urban population under the new definition, and the population in unincorporated places of 2,500 inhabitants or more accounted for the remaining 2.1 percent (1950 United States Census of Population, Bulletin P–A1, p. xiv).

FUNDS FOR RESEARCH

Dr. ELTING. I would like to direct my discussion now to the growth and development which has occurred in the program of research in the States during the past 10 years. We have already noted that total financial support has increased rather markedly over that period, the major part of the increase being in non-Federal funds so that we have today the highest ratio of non-Federal to Federal funds that has existed except for periods just preceding the passage of the Purnell Act in 1925.

Mr. ANDERSEN. Doctor, will you place in the record the amount of funds provided by State and local sources in 1953 as compared to Federal funds?

Dr. ELTING. Yes, sir.

Mr. HORAN. May I amend your request to have the latest figures available? We do not want to ask the impossible, gentlemen.

Dr. ELTING. Here is a table similar to the one placed in the record a year ago. It has been brought up to date to include the 1952 figures. Would you want that much detail?

Mr. ANDERSEN. Yes. We will insert the table in the record at this point.

(The material requested follows:)

TABLE 12.—*Summary by States of expenditures of the experiment stations for the year ended June 30, 1952*

Station	Federal-grant funds							Contractual Federal funds, Agricultural Marketing Act, title II	Non-Federal funds	Grand total
				Bankhead-Jones, title I			Total			
	Hatch	Adams	Purnell	Sec. 5	Secs. 9 (b) 1, 9 (b) 2	Sec. 9 (b) 3				
Alabama	$15,000.00	$15,000.00	$60,000.00	$88,305.89	$136,932.98	$21,671.66	$336,910.53	$3,248.59	$1,267,616.78	$1,607,775.90
Alaska	15,000.00	15,000.00	35,000.00	4,736.40	21,899.00		91,635.40		141,672.17	233,307.57
Arizona	15,000.00	15,000.00	60,000.00	16,740.68	34,234.24	23,099.23	164,074.15		422,857.17	586,931.32
Arkansas	15,000.00	15,000.00	60,000.00	66,187.20	109,922.18	23,002.81	289,112.19		584,995.83	874,108.02
California	15,000.00	15,000.00	60,000.00	102,716.44	94,748.18	27,022.01	314,486.63	8,290.52	5,164,561.14	5,487,338.29
Colorado	15,000.00	15,000.00	60,000.00	25,460.16	47,262.66	48,930.28	211,653.10		569,947.56	781,600.66
Connecticut:										
State	7,500.00	7,500.00	29,904.50	11,256.83	19,562.00	101.72	75,825.05		350,899.66	426,724.71
Storrs	7,042.59	7,500.00	29,999.96	11,247.85	19,206.62	19,609.51	94,606.53	4,958.68	324,899.55	424,464.76
Delaware	14,999.93	15,000.00	60,000.00	5,970.02	27,099.58	3,500.00	126,569.53		282,804.43	409,373.96
Florida	15,000.00	15,000.00	60,000.00	47,664.95	65,491.23	15,565.35	218,721.53	5,729.16	2,859,330.32	3,083,781.01
Georgia	15,000.00	15,000.00	60,000.00	98,402.95	130,051.50	49,793.24	368,257.69	16,186.11	474,803.37	859,247.17
Hawaii	15,000.00	15,000.00	60,000.00	10,463.17	37,751.94	4,695.66	142,910.77	6,127.96	491,070.32	640,109.05
Idaho	15,000.00	15,000.00	60,000.00	16,836.19	40,781.71	16,369.37	164,017.27		539,972.69	703,989.96
Illinois	15,000.00	15,000.00	60,000.00	99,478.95	121,051.85	28,573.45	339,104.25	8,312.37	2,088,039.45	2,435,456.07
Indiana	15,000.00	15,000.00	60,000.00	79,141.32	92,257.75	51,211.02	312,610.09	27,848.87	2,235,104.56	2,575,563.52
Iowa	15,000.00	15,000.00	60,000.00	74,227.20	89,643.46	64,017.96	317,888.62	21,414.84	2,127,811.65	2,467,115.11
Kansas	15,000.00	15,000.00	60,000.00	53,057.23	65,892.67	26,069.62	235,019.52	9,998.65	1,061,700.22	1,306,718.39
Kentucky	15,000.00	15,000.00	60,000.00	93,378.88	117,990.01	8,652.80	310,021.69		643,869.42	953,891.11
Louisiana	15,000.00	15,000.00	60,000.00	60,813.78	91,955.02	25,725.16	268,493.96	7,500.00	1,403,110.10	1,671,604.06
Maine	15,000.00	15,000.00	60,000.00	22,270.68	37,177.35	28,400.00	177,848.03	5,187.16	250,913.48	436,261.51
Maryland	15,000.00	15,000.00	60,000.00	36,488.62	52,830.29	18,423.37	197,742.28		541,874.83	744,804.27
Massachusetts	15,000.00	15,000.00	60,000.00	36,698.19	42,673.96	11,569.25	180,941.40	41,947.21	480,347.35	661,288.75
Michigan	15,000.00	15,000.00	60,000.00	93,777.64	108,660.26	26,940.86	319,378.76		1,365,205.44	1,726,591.41
Minnesota	15,000.00	15,000.00	60,000.00	68,127.21	111,442.51	43,901.61	313,471.33	33,995.97	2,055,166.60	2,368,637.93
Mississippi	15,000.00	15,000.00	60,000.00	86,016.75	121,661.84	45,173.20	336,851.79	6,000.00	1,268,253.23	1,639,100.99
Missouri	15,000.00	15,000.00	60,000.00	78,849.57	101,148.44	23,350.00	293,348.01		799,530.50	1,098,878.51
Montana	15,000.00	15,000.00	60,000.00	18,004.06	35,590.00	40,381.95	183,975.95	1,276.91	772,776.19	956,752.14
Nebraska	15,000.00	15,000.00	60,000.00	41,343.56	59,321.43	20,618.16	211,283.15		1,151,905.22	1,364,465.28
Nevada	15,000.00	15,000.00	60,000.00	3,435.49	21,852.37	8,400.00	123,687.86		65,400.66	189,088.52
New Hampshire	15,000.00	15,000.00	60,000.00	11,363.43	27,769.68	6,400.00	135,533.11		64,891.00	200,424.11
New Jersey	15,000.00	15,000.00	60,000.00	32,575.43	41,834.00	28,065.56	192,474.99	3,897.39	1,271,055.87	1,467,428.25
New Mexico	15,000.00	15,000.00	60,000.00	17,027.28	38,056.79	20,608.93	165,693.00		278,344.49	444,037.49
New York:										
Cornell	13,493.58	13,500.00	53,895.53	97,003.10	104,388.66	59,316.30	341,597.17	5,121.74	2,771,961.35	3,118,680.26
State	1,499.40	1,495.64	5,999.14	10,778.06	11,837.19		31,609.43	10,174.80	893,617.67	935,401.90
North Carolina	15,000.00	15,000.00	60,000.00	135,186.64	154,217.06	41,093.98	420,497.68	3,271.46	1,410,082.30	1,833,851.44
North Dakota	15,000.00	15,000.00	60,000.00	26,670.28	50,421.50	5,482.31	172,574.09		659,959.72	832,533.81

TABLE 12.—*Summary by States of expenditures of the experiment stations for the year ended June 30, 1952*—Continued

Station	Federal-grant funds							Contractual Federal funds, Agricultural Marketing Act, title II	Non-Federal funds	Grand total
	Hatch	Adams	Purnell	Bankhead-Jones, title I			Total			
				Sec. 5	Secs. 9 (b) 1, 9 (b) 2	Sec. 9 (b) 3				
Ohio	$15,000.00	$15,000.00	$60,000.00	$118,853.05	$174,721.60	$19,444.65	$403,019.30	$10,000.00	$1,533,592.43	$1,946,611.73
Oklahoma	15,000.00	15,000.00	60,000.00	63,847.68	89,146.51	22,327.48	265,321.67		1,265,501.43	1,530,823.10
Oregon	15,000.00	15,000.00	60,000.00	35,230.21	49,642.94	43,283.40	218,156.55	2,002.13	1,826,505.15	2,046,663.83
Pennsylvania	15,000.00	15,000.00	60,000.00	155,317.78	143,252.88	38,796.73	427,367.39		1,082,581.50	1,509,948.89
Puerto Rico	15,000.00	15,000.00	59,536.75	66,036.41	106,747.32	3,497.67	265,818.15	6,514.21	857,783.41	1,130,115.77
Rhode Island	15,000.00	14,990.82	60,000.00	6,257.12	27,582.30	27,531.57	151,361.81		95,152.20	246,514.01
South Carolina	15,000.00	15,000.00	60,000.00	68,111.24	95,920.63	31,859.01	285,890.88		723,886.39	1,009,777.27
South Dakota	15,000.00	15,000.00	60,000.00	26,510.78	52,164.67	17,796.62	186,472.07		417,370.67	603,842.74
Tennessee	15,000.00	15,000.00	60,000.00	92,293.90	118,160.41	30,725.74	331,180.05	10,192.85	612,129.79	953,502.69
Texas	15,000.00	15,000.00	60,000.00	150,461.58	179,424.02	65,231.45	485,117.05	16,001.52	2,476,410.64	2,977,529.21
Utah	15,000.00	15,000.00	60,000.00	12,499.09	30,270.40	53,113.40	185,882.89		514,058.02	699,940.91
Vermont	15,000.00	15,000.00	60,000.00	12,884.06	34,532.01	7,417.52	144,833.59		92,131.02	236,964.61
Virginia	15,000.00	15,000.00	60,000.00	88,612.55	112,775.02	24,525.00	315,912.57		985,369.81	1,301,282.38
Washington	15,000.00	14,999.23	60,000.00	43,950.86	73,407.97	62,202.22	269,560.28	6,244.82	1,858,624.53	2,134,429.63
West Virginia	14,997.45	15,000.00	60,000.00	65,792.28	99,362.27	36,734.47	291,886.47	1,800.00	445,540.41	739,226.88
Wisconsin	15,000.00	15,000.00	60,000.00	73,259.15	72,559.81	65,310.49	301,129.45	8,660.35	2,534,156.00	2,843,945.80
Wyoming	15,000.00	15,000.00	60,000.00	7,662.93	31,365.22	18,310.97	147,340.12		426,648.28	573,988.40
Total	764,532.95	764,985.69	3,034,335.88	2,863,312.69	[1] 3,975,664.89	[2] 1,453,844.72	[3] 12,856,676.82	291,904.27	56,883,853.97	70,032,435.06

[1] Includes carryover of $396,947.86 from fiscal year 1951, in accordance with the provisions of sec. 9 (a) of the Bankhead-Jones Act, as amended by the act of Aug. 14, 1946.

[2] Includes carryover of $217,815.09 from fiscal year 1951, in accordance with the provisions of sec. 9 (a) of the Bankhead-Jones Act, as amended by the act of Aug. 14, 1946.

[3] Includes carryover of $614,762.95 from fiscal year 1951, in accordance with the provisions of sec. 9 (a) of the Bankhead-Jones Act, as amended by the act of Aug. 14, 1946.

Mr. ANDERSON. All right, Doctor, continue.

INCREASE IN NUMBER OF RESEARCH LOCATIONS

Dr. ELTING. We have attempted to appraise what this growth in financial support for the experiment stations has meant in terms of nature of the work currently under way. It is obvious from the number of research workers now employed and from the total dollars available that there has been an expansion of program. Actually, there has been about a 40-percent total increase in number of workers during the past 10-year period. In the face of that situation, I am sure the committee might well ask why the present level of financial support is not adequate to meet the needs in the various States. In attempting to appraise that situation, one very striking fact has become apparent, and I would refer you to the third page in the material placed before you, the map indicating the location of research centers in the several States. Between 1942 and 1952 there were actually established within the States 220 new substations or outlying research centers which represented the effort to carry research into the problem areas in the several States.

In most cases this represented direct action of the State legislatures to provide more adequate attack on problems in important types of farming areas, and these centers became, then, the site for a great bulk of the program of applied research, attempting to adapt practices to meet the needs of these many and diverse farming areas. It is a very important and significant development and, as mentioned earlier, it represents very definitely the appreciation on the part of the farmers themselves of having research conducted in their immediate areas so that it will apply to the environment and situation existing in the rather localized communities. At the same time, it represents a tremendous drain on the resources of the State stations. It means that in many cases the stations are spreading their efforts thinly in an attempt to maintain and carry on constructive programs at these many locations. It means, further, that there has not been a corresponding growth in research at the main stations which, by and large, represent the sites of the more basic portions of our research programs.

JUSTIFICATION OF INCREASED PAYMENTS TO STATES

I believe, Mr. Chairman, that brings us to the principal defense of the increase item which is in the budget this year for payments to States.

Mr. ANDERSEN. You made reference to the $1 million increase. I should like to comment at this point on this, so as to avoid duplication later on.

Dr. ELTING. Very well, sir.

COORDINATION OF RESEARCH EFFORT

Mr. ANDERSEN. How do you justify your requested increase in view of the other increases proposed in this budget?

Dr. ELTING. The question you have raised, Mr. Chairman, we fully appreciate is a question that must concern this committee when the askings in this area must be weighed against the total requests for many other programs.

Mr. ANDERSEN. I might say, Doctor, that we have become very aware through recent years as you well know of the possibility of duplication in research all along the line. That, to us, is basic. Mr. Whitten started that inquiry years ago, and I believe the whole subcommittee feels that we must be constantly on guard relative to that.

Mr. HORAN. May I add right there: We think the only cure for duplication is coordination, and we would like to see that reflected in the budget before us, so it becomes crystal clear the minute we start justifying these items. The chairman, I think, has done an excellent job in sorting out these budget requests; so, again our right hand will know what our left hand is doing. That is not by way of criticism. We know of the great work that is being done in this field, but we would like to have it spelled out so that we can have an explanation of the things we accept.

Dr. ELTING. The many items included in the request from the several research agencies of the Department and in the item now under discussion, the program of the State agricultural experiment stations, must be viewed in terms of the total agricultural research program in the Nation that is warranted and justified. By and large, our requests to this committee are expressed in terms of major subject-matter areas, so that we appreciate your concern in coordination and prevention of duplication. I am sure, in discussing that, you appreciate the complexity of the situation we deal with where over 80 percent of the total funds involved at the State experiment-station level are State funds and in no sense under the control of the Federal Government. So, cooperative effort must of necessity then become our main approach to effective coordination.

To discuss how we approach this problem of coordination, I think it is necessary to consider in more detail the activities both of the Office of Experiment Stations and the Office of the Research Administrator, which deal collectively with this problem.

Mr. ANDERSEN. You may have all the time you wish. Go ahead, Doctor.

INVENTORY OF RESEARCH

Dr. ELTING. The main approach, first, to this problem is one of compiling complete information on work currently in progress. We feel that that is done in a very comprehensive manner through the central project files maintained by the Office of the Research Administrator and the Office of Experiment Stations. We, of course, have a detailed record of all work directly supported by Federal-grant funds. Through cooperation on the part of the States we also have a reasonably detailed record of every line of work supported by non-Federal funds, so that there are in our files records of nearly 10,000 separate lines of research, well classified as to subject matter and cross-referenced so that it is possible to locate where any given line of work impinges on related work. In that manner, in a relatively short time, it is possible to review that file and ascertain work that is going on in any given area. That becomes the basis, then, upon which we can ascertain whether any new work proposed does impinge directly or tend to overlap with work currently in progress.

RESEARCH PROPOSAL REVIEW

So far as review of any work porposed, then, probably the most important function of our Office is that of review of project proposals in relation to other work that is in progress, and that review and approval becomes the basis on which the Federal-grant funds may be expended in support of research. Not a dollar of Federal-grant money is expended until the work proposed has been thoroughly reviewed in relation to other work in progress. Typically, that may involve several exchanges of correspondence with the station proposing the work, directing their attention to related work, giving them time to establish contacts with others working in the field and to revise their proposal until there is evidence that they have taken reasonable account of all related work before they finally set up the work plan for new work to be undertaken. That involves work not only going on in other States but also in Federal agencies.

NEEDED RESEARCH ON ANIMAL DISEASES

I think we could illustrate perhaps with one of the specific cases raised: that in animal diseases, an area that is most urgent at the moment. It has been stated in a number of places that the total increase indicated in this year's budget could very profitably be expended in this field alone because there are termendous losses occurring through new diseases for which we do not have adequate means of control. In general, this represents an area in which we are losing ground. We are not keeping pace with the intensity of the problem as reflected in new diseases or greater ravages from old diseases.

VESICULAR EXANTHEMA

Mr. ANDERSEN. Doctor, can you at this time discuss the situation as to this disease in hogs, vesicular exanthema?

Dr. ELTING. That is one case of considerable concern just now.

Mr. ANDERSEN. It would seem to me that we should make a specific appropriation just as we did with foot-and-mouth disease, to stamp out this particular hog disease. I realize it is something extra-curricular, so to speak. Let me ask you this question, Dr. Shaw. Is there any relationship between this hog disease and the so-called foot-and-mouth disease?

Dr. SHAW. Yes, sir, Mr. Chairman. The newest, vesicular exanthema, is very closely related to foot-and-mouth disease.

The vesicular exanthema is so closely related to foot-and-mouth disease that every appearance of the disease has to be treated in the beginning as if it may be an outbreak of foot-and-mouth disease. The symptoms on the swine are exactly the same symptoms as come from foot-and-mouth disease. The only way that we can diagnose the difference between the two diseases is to inoculate a horse, a cow, and a hog with the serum from the infected hog. If the swine and the cow become affected, it is foot-and-mouth disease.

In our diagnosis of it, if the symptoms of vesicular exanthema appear on the cow, then we have rather positive evidence we are dealing with foot-and-mouth disease. If, on the other hand, the hog gets the disease from the inoculation but the cow and the horse do not,

we have pretty good evidence that it is this new disease, vesicular exanthema. If the horse gets symptoms and the cow and swine do not, it is vesicular stomatitis. The 3 things are so closely related that the only way that we can make the diagnosis is to make those inoculations of the 3 animals.

Mr. HORAN. Might I add that the Canadians, some of them, insist that what they have is stomatitis and not foot-and-mouth. I understand they did have some horses up there that were affected.

Dr. SHAW. We have quite a little stomatitis, both here, in Canada, and Mexico and it has always been a problem. The relation to foot-and-mouth disease is so close it is entirely likely that they had both stomatitis and foot-and-mouth disease. We feel relatively sure that they had foot-and-mouth disease in Canada.

Now, because they are so closely related, it places an extra burden on the Nation in connection with every outbreak that you get around the country of this vesicular exanthema and we are all frightened to death that it is foot-and-mouth disease each time. So that is an extra thing that we have got to worry about.

We have no means, laboratory means, of differentiating between these three viruses. You have to go through that inoculation process. The symptoms on the hog are exactly the same symptoms as foot-and-mouth disease.

COORDINATED DISEASE-CONTROL PROGRAMS

Dr. ELTING. Assuming, Mr. Chairman, that there are acute situations as exemplified by VE that may require special treatment and financing, there are many other areas that are more chronic in nature but are taking a tremendous toll. We can illustrate that by the recent activities in the field of X disease of cattle which represents a very well coordinated effort at joint planning on the part of the Federal Bureau of Animal Industry and the many States involved so that there was definite coordination of effort and no duplication. We have made excellent progress in a period of 2 or 3 years in unraveling factors causing this malady. There are other areas that are of major concern. For example, anaplasmosis, which has been with us many years and yet is definitely on the spread and is now recognized in areas which a few years ago we assumed were not susceptible areas. Just 2 weeks ago there was a national planning conference held in Oklahoma attended by specialists from the Department and many States to re-examine our program and to plan a more aggressive and better coordinated program in combating the spread of anaplasmosis. The respiratory complex of diseases attacking poultry is another area which is chronic and which occasionally breaks out in acute form. That has been exemplified in recent years by the air-sac infection of poultry which is certainly one manifestation only of this disease complex. We develop measures that will check or partially control some manifestations of this disease, to have it then reappear in some other acute form.

Looking over some of the requests made by the individual States, we find that atrophic rhinitis in swine is another area that is now becoming acute, perhaps so acute that it will have to be treated under special provision, but by joint planning within the limits of our facilities certainly we can make some progress; maybe not as rapidly as desirable but we can attack some of these acute problems.

Mr. ANDERSEN. Doctor, you mentioned the air-sac disease in poultry. You know, of course, that the Bureau of Animal Industry has a specific allotment this year for that particular disease research?

Dr. ELTING. And that allotment is very largely expended in cooperation with the State experiment stations so we appreciate that there has been special provision made in that case.

The chronic loss of young pigs is another area in which we are not dealing with a specific disease but rather a complex both of pathological and nutritional nature, and despite our best efforts we do not seem to greatly reduce the mortality losses in young pigs. It is a baffling thing that demands even greater effort than we have been able to put in it if we are going to reduce these losses.

PROGRESS IN DISEASE CONTROL QUERIED

Mr. ANDERSEN. Now, Doctor, at that point. From what you have said here so far today, it would indicate to me that we are not making much headway with much of this research, that if anything we are on the downgrade as far as results are concerned. Is that a fact?

Dr. ELTING. I think the answer to your question, Mr. Chairman, is that we are constantly combating nature; that nature seems to develop new problems, new diseases, new strains of infections as rapidly as we are able to combat and learn to control the ones that have been with us. It is illustrated both in the animal and plant field, perhaps nowhere better than the wheat rust problem where there is no end to our efforts. It is a case of a major effort to hold our ground and to not be overrun by new manifestations of diseases or pests. No one can say where we might be today if we had not made the progress that we have. We know that certain things have been brought under control. We know that infectious bronchitis in poultry is rather effectively controlled by vaccines.

FUTURE PROBLEMS OF ANIMAL DISEASES

Mr. ANDERSEN. Doctor, in your opinion, are we going to have to look forward to continuously having new outbreaks of things that come out about the time we think we have the old problems licked?

Dr. ELTING. I am convinced that we will be continually faced with that.

Mr. ANDERSEN. We think we have cholera and Bang's disease on the way out, including TB, and then we come into this other vaster field that has to do with foot and mouth. Do you feel that we can anticipate more and more difficulty as we proceed?

Dr. ELTING. Yes, sir; I am firmly convinced of that.

Mr. ANDERSEN. Would that be largely due to our intense production?

Dr. ELTING. Possibly so. There are many factors that are involved there. Very often, when we bring one trouble under control we seem to create an environment where another infection takes hold. In our problem of sterility of cattle, that is well illustrated. We have, for many years, fought brucellosis. We have made considerable progress in eliminating brucellosis in certain areas. We find now a new disease, vibrio fetus, a type of abortion that in certain areas has become almost as acute as brucellosis was in years past.

That is simply another illustration of complications that develop where we can control one aspect of a problem and another manifestation appears.

So I think there is an area there, particularly in disease and pest control, where we have a never-ending fight on our hands and that we have got to do a tremendous amount of research to keep abreast of nature.

BRUCELLOSIS CONTROL METHODS

Mr. MARSHALL. Doctor, you mentioned brucellosis. There is considerable difference between States on the control of brucellosis. What does the Office of Experiment Stations do with regard to that?

Dr. ELTING. There again there has been a joint planning conference; in fact there have been several of them held periodically to deal with the brucellosis problem in which both the States and the Federal Government have been involved. A number of the States are working on the vaccine problem which perhaps seems to hold the greatest promise—Michigan, Wisconsin, Ohio, are States that are very active in that field. The Department, of course, produced the vaccine that has been most widely used and probably is the best that we have to date although there are other developments in prospect that have not been fully evaluated that we believe also hold real promise. It is somewhat comparable to the long fight we have been through and actually are still going through in hog cholera where we see little prospect that we can completely eradicate the disease. We probably will have to learn to live with it as best we can with the best control measures that can be developed.

Mr. LAIRD. Are you doing any work on strain M or do you recommend strain 19 vaccine after tests at the various stations?

Dr. ELTING. Strain M is still definitely in the experimental stage. As I understand it, there is a limited license now for its use across State lines for experimental purposes only. So I think we have to say that strain 19 is the only one that is generally recommended and any others are still in the experimental stage.

Mr. LAIRD. Do you encourage the experiments with strain M?

RESEARCH PROPOSALS ORIGINATE IN THE STATES

Dr. ELTING. When you use the word "encourage" you are getting into an element here of how these State programs originate, and I think I should explain that the main initiation of programs rests with the States. We do encourage in the sense that we certainly approve the use of the Federal grant funds where proposals come in that are well justified. We certainly encourage the joint participation in planning to prevent duplication and to attain the best integrated program possible, but recognizing always that the major initiation still rests with the experiment station. In other words, this is not a federally directed program in the sense of specifying areas of work. It is one in which the several States have primary right of initiation.

EXTENT OF FEDERAL ASSISTANCE TO STATE RESEARCH

Mr. LAIRD. I was referring to a State like Wisconsin, which is spending yearly nearly $2 million on a Bangs vaccination program. I don't know what the total expenditure is throughout the country by

individual States but I do know our State makes a larger contribution than any other State to the program for eradicating brucellosis. As I understand it, our State is also working on strain M on a very limited scale as our State agricultural department does not encourage strain M. They use strain 19. Do you help a State that is doing a vast amount of research and working itself on a problem more than a State that is not doing its full share in solving a problem on its own?

Dr. ELTING. I assume "help," in the sense you used it there, applies to the extent of cooperation with the Federal bureau, in this case the Bureau of Animal Industry, because you understand the funds we are discussing here this morning are funds that are allotted directly to the States and are expendable under their direction on the basis of approved projects.

Mr. LAIRD. Do those projects have to be approved by you?

Dr. ELTING. Yes, sir.

Mr. LAIRD. At the experiment stations in the State?

Dr. ELTING. Those involving support under the Federal grant funds are in all cases submitted for review and approval before the funds are expended. In other words, it is a system evolved over the years of administration of the funds on an approved-project basis. That has been accepted for 45 years as a basis for administration.

Dr. SHAW. Mr. Chairman, could I point out here—the control program, as you know, is not handled by the State experiment stations?

Mr. ANDERSEN. That is correct.

Dr. SHAW. But by the State departments of agriculture. Also, the control work in the Bureau of Animal Industry is cooperative there. So that we may have States actively engaged in some experimental work trying to develop new control procedures even though we might not have an effective control program in the State.

Mr. ANDERSEN. That is correct.

Doctor, I really do not think that we have come very far in the answer to the question. Let us be more specific. Take this air-sac disease, or take this atrophic rhinitis in hogs, for instance. You are basing your justifications for this increase upon the needed additional research along those lines, are you not?

Dr. ELTING. Yes, sir; in part.

Mr. ANDERSEN. Now, the Bureau of Animal Industry has specific allotments, at least for the air sac. Do they have funds for the atrophic rhinitis?

Dr. SHAW. No.

PLANNING COORDINATED PROGRAMS

Mr. ANDERSEN. Just how does your Bureau work through the experiment stations on air sac; how do you coordinate that with what we expect BAI to do?

Dr. ELTING. When the problem became so acute last spring, Mr. Chairman, and funds were secured in reasonable amount to make a prompt attack on it, the approach taken was a series of cooperative agreements between the Bureau of Animal Industry and a group of States that had personnel and facilities that they could immediately throw into this fight. There were seven States at that time, as I recall, which entered into agreement with the Bureau and the record would show that the State money that was contributed by these

cooperating stations was larger in total than the amount of money that the Bureau of Animal Industry was able to allot on a cooperative basis.

Not all of the Bureau money was used that way because they do have laboratories and specialists of their own. I am saying that it was a well-planned, coordinated effort, that the States also made financial contribution to it, and yet the fact is, I think, the total effort today is not as great as that problem would warrant. I think that is illustrative of what is happening in practically any area that we mentioned. I will say that the field of animal diseases and pathology represents as well a coordinated field perhaps as we can pick where typically we approach these things through joint planning conferences just as I mentioned in anaplasmosis and in X disease, as has been exemplified in the past 5 or 6 years in Newcastle's disease in poultry. In each case I think it is a question of how much total support is warranted in relation to the seriousness of the disease. We firmly believe that the total effort which has been provided to date is not adequate and that there is sound justification for expanded support. That support, as you point out here, appears in the estimates both of the Bureau of Animal Industry and in the program of the State experiment stations.

Mr. ANDERSEN. Doctor, will you comment briefly on those other lines of research that I quoted?

COORDINATION ON AIR-SAC-DISEASE CONTROL

Dr. SHAW. Mr. Chairman, before you go to those, could I make an additional comment on this air-sac disease about which you raised a question?

When that became acute, we got together all of the scientists in the State experiment stations whether they had currently worked on it or whether we felt they were competent to do work on it. We got them together with scientists from the BAI, and we figured out what the approach ought to be, jointly, to get at this disease. So we did find that the Massachusetts Experiment Station in terms of the competence of the people there, was particularly qualified to attack this phase of it. We had Connecticut that seemed to be competent to attack another phase. So it was a jointly planned effort by all the scientists that are engaged in it. We are bringing those people back together. They have been together about three times now, in terms of just following it and keeping right in touch with it, so that this is being worked out as a single effort even though it is divided up between the BAI and the State experiment stations.

Mr. ANDERSEN. It seems to me you have good coordination there.

RESEARCH IN FORAGE CROPS

Now take the "Forage" subheading, Dr. Elting, and discuss that.

Dr. ELTING. As I see it, Mr. Chairman, your concern covers two points: One is the total effort as reflected in these several estimates justified, and two is an adequate job of coordination being accomplished.

Mr. ANDERSEN. That is correct; how do you avoid duplication and waste?

Dr. ELTING. The forage-crop field is very much in our thinking at the present time, as you are aware. Under a joint land-grant college-department program, extensive activities are being undertaken in the field of forage-crop production and grassland farming, to use a very broad term. It has long been recognized that if we are to make the best progress in soil conservation to bring unproductive acres into productivity and to maintain our livestock production on a sound and economic basis, grass and forage-crop production holds the key, perhaps, more than any other single thing to the solution of these problems. Therefore, we are witnessing a growth here in a field which traditionally has been neglected in years past. I would say it is only within the last 15 years that we have really had anything approaching an adequate program in the field of grass and forage-crop production.

For many years when we concentrated our effort on the tilled crops, grass was assumed as something that would take care of itself and would grow on those acres that were not used more intensively. So when we find considerable requests for expansion of forage crop research, I think it is normal in relation to the importance that we now attach to grass and forage-crop production, and I think the problems there are so numerous that even the estimates that we have here will not permit attack in many of the problem areas. As I run down the list of specific items requested by the States in that field, one of the most common is the question of general economics of our farm practices.

In other words, as we develop new facts through grass and forage crop research, we ascertain that certain things will work, and then we must ascertain whether they also pay. So there is great joint effort between the physical and the economic aspects of this broad problem that are receiving wide attention and needed expansion.

DUPLICATION OF RESEARCH POSSIBLE

Mr. ANDERSEN. Doctor, let's get specific. As I said before, a total of over $3 million is included under the Forest Service for research on forests and range. In addition, over $800,000 is included under the Bureau of Plant Industry for research in forage-crop production, breeding, disease and quality investigation. And in addition, we have $293,000 requested by the Bureau of Animal Industry for development of better methods of utilization of more forage by livestock.

It would seem that we must be very careful along the line if we are going to avoid waste through duplication or lack of coordination. Yet, you cite this as one of the very necessary fields to back up your requests for increase. We have been making studies for a good many years in all kinds of forage crops, have we not, through all experiment stations?

Dr. ELTING. That is true, there has been work in progress for many years; yes, sir.

Mr. ANDERSEN. I know from personal experience that it has been going on for 45 years. I have read a good many of these farm bulletins for years back and they have been very helpful. But, how can we justify at this time any increase in this particular line of work, especially when you have at least three other major bureaus in agriculture going into very similar lines of research.

Doctor, I do not want to belabor this point. I wish, however, that you would take one or two of these general classifications, get specific data on them, and put in the record a clear analysis which might tend to remove from our minds any doubt as to proper coordination along the line.

(The information requested is as follows:)

INCREASING THE PRODUCTION AND IMPROVING THE UTILIZATION OF FORAGE CROPS

The general practice, adopted in the interest of brevity, of broadly classifying all agricultural problems into 10 or 12 major categories gives little insight into the many specialized problems which exist under each such major group. The field of forage crop production and utilization typifies this situation. The field involves many species of plants produced under many varying environments. It ranges in intensity of production from the sparsest range to the most heavily fertilized and irrigated crops harvested and processed as hay or silage. It is intimately associated with soil conservation practices, better land use, effective rotation practice and crop adjustment. It involves a multitude of problems in breeding and selection for improvement; in finding the best combinations of plants for various purposes; and in cultural practices as related to soils and climate. It poses problems in disease and insect control. Adequate seed supplies of improved strains poses major problems. Measuring efficiency of utilization by various types of farm animals is an area requiring much additional research. Likewise, the economics of forage crop production in relation to alternative enterprises must be more widely studied.

When viewed in the light of these many problem areas it is understandable that many research agencies of the Department of Agriculture and practically every State experiment station has a direct interest in attacking some unsolved phase of the problems. It is only as these interests are reduced to specific plans for attack on the problem that it becomes possible to fully coordinate the program, effect the desirable cooperation, and prevent duplication of effort.

Current and proposed research of the State agricultural experiment stations in the field of increasing the production and improving the utilization of forage crops is coordinated effectively through regional technical committees, which have been established in each of the four major agricultural regions. These technical committees include a research worker from each experiment station of the region, one from each cooperating USDA bureau, a member of the staff of the Office of Experiment Stations, and a director of one of the experiment stations who serves as an administrative adviser to the committee and directs its activities. These committees meet annually to report on results of work in progress both in the States and the Department, and to plan coordinated or cooperative attacks on the most pressing problems awaiting solution. National coordination is accomplished by exchanging reports among the regional committees, correspondence, and occasional meetings of the four administrative advisers during the annual meetings of the directors. The Office of Experiment Stations staff member, who meets with these committees, also assists in coordinating the work among the four regions as well as that among the States of each region. The coordinating mechanism provided by the four regional technical committees, which act as clearinghouses for conducting and planning research in forage crops, is an effective device to prevent any unnecessary duplication of work among the States and the agencies of the Department and to provide such replication as is needed to meet varying conditions among the regions. Additional coordination is provided by the Office of Experiment Stations in their review and approval of the research programs of the experiment stations. The progress of research is also reviewed annually in the field by experienced specialists from the Office. This review is comprehensive and provides an excellent basis for coordination and prevention of duplication of research effort.

In addition to the general coordination of research discussed above, each of the regional technical committees is conducting or proposes to conduct cooperative regional research on specific problems of forage crop production and utilization.

Thus in the north central region 12 experiment stations and Oklahoma are cooperating with the Bureau of Plant Industry, Soils, and Agricultural Engineering in uniform trials of varieties and strains of smooth bromegrass, timothy, red clover, and birdsfoot trefoil, to discover those that are best adapted to a wide variety of conditions. New and promising varieties developed through

research are tested at selected points in the region and the best are recommended for inclusion in the National Foundation Seed Stocks project. To date three new officially approved varieties of smooth bromegrass have been released. Sweet clover will be included in next year's trials, and if additional funds are provided under section 9b 3 of the Bankhead-Jones Act a regional study will be undertaken to obtain basic information on how to reduce losses in stand and yield of alfalfa due to blackstem disease.

Twelve State experiment stations in the northeastern region, the United States Regional Pasture Research Laboratory, the Bureau of Plant Industry, Soils, and Agricultural Engineering, the Bureau of Entomology and Plant Quarantine, and the American Seed Trade Association are cooperating in a regional study of the effect of climate and soil conditions on important species and strains of forage crops, and are also conducting uniform trials of new varieties and hybrids developed in the region or elsewhere. Included in these tests are Ladino clover, birdsfoot trefoil, alfalfa, red clover, orchardgrass, bromegrass, and timothy. Pennscott red clover and Narrangansett alfalfa have been included in the National Foundation Seed Stocks project as a result of this cooperative effort. The important area-wide problem of loss of stands through winterkilling will be studied intensively if additional funds are provided.

The cooperative research of 12 experiment stations in the southern region and Puerto Rico is cooperative with the Bureau of Animal Industry, the Bureau of Dairy Industry, and the Bureau of Plant Industry, Soils, and Agricultural Engineering and involves the basic problem of developing reliable methods for measuring the yields of forage crops and pastures in terms of their value as animal feeds. Uniform variety and strain tests of various grasses and legumes adapted to the area are also conducted. Work planned if additional funds are appropriated would deal with the development of improved methods of producing, harvesting processing, and storing seed of forage crops adapted to the Southern States.

Ten experiment stations of the western region and Hawaii have cooperated with the United States Forest Service, the Soil Conservation Service, and the Bureau of Agricultural Economics in planning cooperative regional research on problems of rangeland development under the increased funds requested for 1954. The first phase of this study would be directed to economic aspects of range improvement to provide needed information on costs and benefits of reseeding, brush control, and other practices. The problem of getting maximum economic production of livestock from rangelands and achieving adequate conservation within the limits of economic feasibility is one of prime importance to the future development of the vast rangelands of the Western States.

The above-described organization provides a framework for coordinating current research and for appraising other pressing problems, determining priority of needs and the effective planning and conduct of additional research.

These principles apply equally to the other areas of research discussed by the chairman of this committee.

There has evolved over years of experience in working together a well defined pattern of responsibility and activity for the Department agencies and the State experiment stations. The Department takes the lead in attacking phases of major problems having national or broad regional significance. Likewise the State experiment stations have a well defined role in dealing with phases of such problems in which they have major responsibility particularly as they apply to local conditions in the many type-of-farming areas existing in each State. The active cooperation existing throughout the research structure is the key to effective coordination, insuring a well-integrated program.

EMPHASIS ON AVOIDING DUPLICATION OF RESEARCH

Mr. LAIRD. Mr. Chairman, as a new member of this committee, I don't get the idea that there is adequate coordination between the various State agencies and the vast numbers of agricultural research projects on a Federal level. It bothers me just from knowing what goes on at the great agricultural College of the University of Wisconsin. We must be sure that the USDA through its various bureaus is not duplicating research work.

Mr. ANDERSEN. I have exactly the same concern, Mr. Laird. I certainly want that doubt resolved before we permit any further increases.

Mr. WHITTEN. Mr. Chairman, I certainly don't differ with you. I have struggled along the same lines for several years.

Mr. ANDERSEN. I might say that you really started this line of investigation.

MUCH OF PROGRAM IS SUPPORTED BY STATE FUNDS

Mr. WHITTEN. One thing that I have found to be a problem is that when you put down in print a description of a research project, it frequently reads almost exactly like a written description of other projects, where the actual work is entirely different. The difference doesn't show in the descriptive title. Another thing that enters into it is that the geographical differences are such that what applies to one particular State may not apply to another. Then you have the further fact that what an experiment station does depends largely on whether the funds are provided by the State legislation.

After all that, after we face all those conditions, still every effort should be made to try to keep States from doing things that others are doing. It is a continuing job to prevent this duplication. I am glad to see the chairman go into this matter. But I did want to point out some of the things that I have run into in my efforts along this line.

Mr. ANDERSEN. Mr. Whitten, I certainly agree with you that the experiment stations have done a fine job in the past. In fact they have been very close to me personally, and that is all the more reason why I want to see them continue the good work that they are doing. I realize, Doctor, the problems you have in trying to coordinate the work in the various States. The States do put in the bulk of the money and they anticipate having the principal say on certain things. But if this discussion will help in any way to emphasize the problem, I think it has been worth while.

Dr. ELTING. I would agree, Mr. Chairman. If I may, I would like to talk very briefly to that point. I don't believe I have had an opportunity up to this time to explain all of the mechanisms that go into this coordination effort. If I may expand there just briefly——

Mr. ANDERSEN. Go ahead, sir.

REVIEW OF WORK IN THE FIELD

Dr. ELTING. One other important activity of the Office of Experiment Stations is the one of annual examination on the ground of the work and expenditures in progress at the several experiment stations. In the course of that, and in our actual interviews with project leaders and research workers, we get a very real picture of work that cannot be reflected in any typed reports or work plans. So that in itself is a very important factor in our efforts at coordination, that is bringing to the attention of other interested people, work that is in progress.

Mr. ANDERSEN. You are absolutely right, Doctor. You cannot gain from the printed word any picture whatsoever in comparison

to an on-the-spot inspection of the research activities at the State level. I believe that you are on the right track when you study on the ground what the States are doing.

Dr. ELTING. That definitely is done and will, during the next 3 months, have practically our entire technical staff visiting every experiment station, spending a period of approximately 2 weeks there. During these visits they actually interview every project leader and get first-hand information on the progress and the problems that he has encountered and they will furnish such help as we can give in relating his work to that of others, to bringing interested people together. Then the experiment-station directors themselves have been very active in recent years through their regional organizations and through their systems of technical committees and administrative advisers representing the regional groups of directors, to provide a mechanism that permits exchange of ideas and group planning. As I mentioned previously in connection with our regional research program, I think it is becoming a very important medium of exchange and because of that better integration of effort results.

Might I, then, summarize our justification here on this increase item?

Mr. ANDERSEN. Yes.

NEED FOR BASIC RESEARCH

Dr. ELTING. We feel that the increase item must be reviewed in relation to the urgent need for an expansion of our program in basic research which has not kept pace with the applied program carried on at the many outlying locations in the several States. The Federal-grant funds traditionally have tended to support the more basic types of program at the experiment stations, with the State funds tending to build the supporting program around this core of more basic research.

Actually, much of our program of applied research is handicapped and perhaps inefficient in the sense that too much of it has to be done on an empirical basis simply because we don't have complete understanding of certain phenomena. It is perhaps nowhere better illustrated than in this current interest in the use of antibiotics in livestock feeds, a development that has overrun our knowledge. There is a demand for it and we find it being practiced, additions being made to our mixed feeds before we have sufficient basic knowledge of the mode of action of these antibiotics to understand why they have a stimulating effect on the growth of swine and poultry. If we just had the basic information behind phenomena of this sort, we could be spared much of the empirical testing that now is our only avenue of approach to it. So, in feeding trials, in fertilizer trials, in spraying trials with insecticides and fungicides, we are forced to keep too much of our program on this general testing basis simply because our basic research program has not been able to provide the answers as to why many of these things occur. So, I say again, I think the need for an expanded program of basic research is full justification for the increases that are requested, realizing that it must involve the fullest effort to achieve an efficient and well-coordinated program.

NEW POSITIONS

Mr. ANDERSEN. Doctor, what new positions do you propose for 1954 and how will they be assigned?

Dr. ELTING. The only positions directly involved in this are positions that would be filled through the three percent of this fund set aside for administration. The other positions would be State personnel. The three percent of the million-dollar increase would amount to $30,000, which would cover 5 new positions; 2 additions to our technical staff, and 3 clerical positions.

SALARIES AND EXPENSES

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$390,090	$380,000	$380,000
Reimbursements from non-Federal sources	25	400	400
Reimbursements from other accounts	15,495	11,500	11,500
Total available for obligation	405,610	391,900	391,900
Unobligated balance, estimated savings	−4,582		
Obligations incurred	401,028	391,900	391,900

NOTE.—Reimbursements from non-Federal sources above are from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Administration of grants and coordination of research with States	$227,750	$226,900	$226,900
2. Federal experiment station, Puerto Rico	157,758	153,100	153,100
3. Obligations under reimbursements from non-Federal sources	25	400	400
Total direct obligations	385,533	380,400	380,400
Obligations Payable Out of Reimbursements From Other Accounts			
2. Federal experiment station, Puerto Rico	15,495	11,500	11,500
Obligations incurred	401,028	391,900	391,900

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	79	77	72
Full-time equivalent of all other positions	6	6	6
Average number of all employees	84	82	75
Average salaries and grades:			
General schedule grades:			
Average salary	$5,465	$5,625	$5,628
Average grade	GS–7.7	GS–8.0	GS–7.8
Ungraded positions: Average salary	$1,123	$1,160	$1,234
Personal service obligations:			
Permanent positions	$301,055	$305,285	$306,317
Part-time and temporary positions	4,729	5,025	3,962
Regular pay in excess of 52-week base	999	1,132	1,175
Payment above basic rates	19,063	20,591	22,079
Total personal service obligations	325,846	332,033	333,533

Obligations by objects—Continued

Object classification	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
01 Personal services	$312,050	$321,033	$322,533
02 Travel	11,256	11,650	11,650
03 Transportation of things	3,455	3,250	3,300
04 Communication services	2,455	2,300	2,300
05 Rents and utility services	1,590	1,700	1,700
06 Printing and reproduction	16,499	14,550	13,500
07 Other contractual services	1,359	1,500	1,500
Services performed by other agencies	1,446	700	700
08 Supplies and materials	35,563	22,500	22,000
09 Equipment	1,875	3,900	3,900
15 Taxes and assessments	272	350	350
Subtotal	387,820	383,433	383,433
Deduct charges for quarters and subsistence	2,287	3,033	3,033
Total direct obligations	385,533	380,400	380,400
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	13,796	11,000	11,000
08 Supplies and materials	1,699	500	500
Total obligations payable out of reimbursements from other accounts	15,495	11,500	11,500
Obligations incurred	401,028	391,900	391,900

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$42,564	$42,655	$40,355
Obligations incurred during the year	401,028	391,900	391,900
	443,592	434,555	432,255
Deduct:			
Reimbursable obligations	15,520	11,900	11,900
Adjustment in obligations of prior years	1,867		
Unliquidated obligations, end of year	42,655	40,355	40,755
Total expenditures	383,550	382,300	379,600
Expenditures are distributed as follows:			
Out of current authorizations	343,106	344,300	341,600
Out of prior authorizations	40,444	38,000	38,000

Dr. ELTING. The second item in our estimates is that of salaries and expenses. We have already, I think, discussed rather fully the functions of our office.

Mr. ANDERSEN. First, Doctor, we will insert pages 100 through 104 and page 110 of the justifications at this point.

(The pages referred to are as follows:)

Salaries and expenses

Appropriation Act, 1953	$380,000
Budget estimate, 1954	380,000

Project statement

Project	1952	1953, estimated	1954, estimated
Salaries and expenses, Office of Experiment Stations, Agricultural Research Administration:			
(a) Administration of grants and coordination of research with States	$227,750	$226,900	$226,900
(b) Federal Experiment Station, Puerto Rico	157,758	153,100	153,100
Unobligated balance	4,582		
Total appropriation or estimate	390,090	380,000	380,000

STATUS OF PROGRAM

GENERAL

The Office of Experiment Stations (*a*) administers the Federal-grant acts involving support of the State, Territorial, and Puerto Rico agricultural experiment stations; (*b*) operates the Federal Experiment Station in Puerto Rico; and (*c*) operates the newly established Virgin Islands agricultural program.

ADMINISTRATION AND COORDINATION OF RESEARCH

Except for the regional research fund, the payments to States are made directly to each station at the beginning of each quarter of the fiscal year according to formulas prescribed by the authorizing acts. The director of each station has the responsibility of determining the program of research to be undertaken through use of these funds. In this way prompt and close range attention to the most urgent local agricultural problems is assured since the determination of program needs is made in the States. However, to assure proper coordination and to prevent duplication of effort, each individual line of research conducted wholly or in part through use of these payments to States must be approved by the Office of Experiment Stations in advance of any expenditure of funds. The principal steps involved in the administration of these grants by the Office of Experiment Stations are:

1. Examination and approval of individual lines of research submitted by the agricultural experiment stations for support under the several funds. This examination is made to ascertain that the proposed research is in conformity with the terms of the enabling legislation and that it is adequately financed, properly staffed, and effectively coordinated with similar research at other experiment stations and in the Department of Agriculture.

2. Approval of an annual program of work submitted by each station at the beginning of each fiscal year, with a tentative allocation of funds to each line of research included in the program. Subject to approval by the Office of Experiment Stations, necessary modifications both as to subject matter and allotment of funds to projects may be made within the fiscal year.

3. Annual examination at each experiment station by members of the technical staff of the Office of Experiment Stations to determine whether the station is complying with the terms and provisions of the several acts. This involves a review of progress on each individual line of research and an examination of the accounts to ascertain that the moneys are used for appropriate purposes. On the basis of such annual examination, the Office certifies each experiment station as to its continuing eligibility to receive funds appropriated for payments to States.

4. Requiring of each experiment station after the close of the fiscal year a sworn financial statement indicating the use of the funds during the year.

5. Preparation of an annual report to Congress covering the work and expenditures of the agricultural experiment stations.

In addition to the specific steps enumerated above regarding administration of these funds, the Office of Experiment Stations through its staff of research specialists carries on numerous activities pertaining to most effective use of these Federal grants for research. These include the maintenance of extensive project records, not only regarding the research financed by these Federal grants but also the extensive and closely related programs of research in the experiment stations supported by non-Federal funds; the analysis and dissemination of information on current research activities; review of accomplishments in selected lines of work; participation in research planning conferences, particularly with reference to the organization and planning of regional research projects. These specialists also function extensively in a liaison capacity between State agricultural experiment stations and research agencies of the Department with reference to the development of cooperative research between State and Federal agencies.

FEDERAL EXPERIMENT STATION IN PUERTO RICO

The research investigations of the Federal Experiment Station in Puerto Rico fall into two broad categories, (1) those dealing with crops of strategic importance to the United States, and (2) research on crops of value to the southern United States, conducted largely in cooperation with the other research agencies of the Department.

The government of Puerto Rico has continued to supplement the research of the Federal station by a small annual appropriation for cooperative research on local agricultural problems. This program has been concerned particularly with such crops as vanilla, bay, and spices.

The station program is divided into major lines of work as follows:

1. Insecticidal crop investigations (rotenone).
2. Drug crop investigations.
3. Food crop investigations.
4. Plant introduction and propagation.
5. Control of insect pests and plant diseases, by introduction of natural enemies and other means.
6. Investigations on crops of local importance in cooperation with the government of Puerto Rico and other agencies.
7. Erosion control and stable crop production.
8. Weed control investigations.

SELECTED EXAMPLES OF RECENT PROGRESS

1. *Potential new insecticides isolated.*—The insecticidal properties of the various parts of the mammey tree have been recognized for many years. Although the seeds from the fruit of this tree have been the subject of numerous investigations, the isolation of the toxic compounds in pure form has not been previously reported. A procedure was developed which led to the isolation of three pure, toxic, crystalline compounds and to one toxic amorphous solid. The crystalline compounds appear to be weak phenolic acids. These four substances accounted for 83 percent of the toxicity of mammey extract. Three other crystalline substances were also isolated. Their toxicities have not yet been determined. During the past year this laboratory received several requests for samples of the pure toxic compounds, indicating a widespread interest in these potential insecticides.

2. *Pollination agents of Brazilian rubber discovered.*—Previous investigations with Hevea led to discovery of certain midges as the chief pollination agents of this plant in Puerto Rico. Because of the importance of determining additional information regarding this strategic crop, further investigations were conducted in Brazil through cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering. These studies indicated that several different midges were also chiefly responsible for Hevea pollination in Brazil. The small size (approximately 1 millimeter in length), similarity in color to the petals, and limited periods of activity probably explain failure of previous efforts to identify these insects. Thier discovery should assist materially in rubber breeding programs.

3. *Investigations on effects of 2–4–D on plants produced new information.*—(a) With velvet beans, it was found that 0.1 or 0.5 percent 2–4–D treatment caused cessation of photosynthesis within 5 hours after treatment and caused extensive damage to leaf tissue. The plants died before any pronounced modifications occurred in stem tissue. With a 0.01 treatment rate of photosynthesis declined within 5 hours after treatment but continued at a reduced rate for several days. This treatment caused very little damage to the tissues of the leaf but caused extensive cell proliferation in the stem tissues which crushed the sieve tubes and presumably inhibited water conduction. Photosynthesis in plants sprayed with 0.001 percent 2–4–D was not appreciably affected until a week or more after treatment. Although growth ceased, the plants were not killed and assimilation continued at a reduced rate for several weeks after treatment. Associated with this was a sequence of morphological developments and cell changes in the stem, similar to but much less extensive than that which occurred with the 0.01 percent treatment. Such information is valuable in determining effective rates of application of 2–4–D.

(b) In studies on the effect of 2–4–D on nutgrass it was shown that more tubers were killed when the tuber chains were broken up. It was found that 2–4–D does not move readily through an underground tuber chain; consequently, killing the top tuber has little effect on the other tubers further down the chain. It was also shown that nutgrass grows only from preformed buds and partially owes its ability to persist in the soil to its high content of starch grains in the tuber on which it can live for at least a year without sprouting. Breaking of the tuber chains causes sprouting of the various tubers which can then be killed by 2–4–D. This information should lead to more effective methods of controlling this weed pest.

4. It has long been considered generally impossible to graft monocotyledonous plants because they have no cambium. However, a method has been developed

at the Federal experiment station in Puerto Rico whereby successful grafts of several monocotyledonous plants have been obtained including bamboo, sugarcane, guinea grass and Merker grass. While the percentage of successful grafts has been relatively low, this method offers a new approach to the improvement of a number of monocotyledonous plants.

5. Compatible, high-yielding grass-legume forage combinations were developed for Puerto Rico. In a fairly extensive experiment on the development of higher yielding tropical forage crops, it has been found that the tropical kudzu and trailing indigo legumes can be grown successfully in association with Merker grass. Over a period of 3 years and through repeated cuttings these 2 legumes were able to maintain themselves successfully. The compatible combinations significantly outyielded either grass or legume grown separately in total forage and in total protein. Substantial increase in forage production can be accomplished through use of the grass-legume combinations.

6. Partial control of vanilla root rot can be accomplished through use of soil fumigants. This disease which is the limiting factor in vanilla production in Puerto Rico, was partially controlled on plants that had reached bearing age by use of chloropicrin and formaldehyde. The plants were prepared for fumigation by cutting away all dead tissue from the vine and the support tree. After fumigation, the beds were covered with cloth sacks for 1 week and the tree and the vanilla plant were then sprayed with Bordeaux mixture. When the sacks were removed, cocopeat was placed on top of the mulch and the stem ends of the vanilla vine buried in it. Seventy-six percent of the treated plants without pods recovered and 42 percent of the plants with pods recovered after treatment. Since it takes the vanilla plant several years to reach bearing age, losses can be reduced substantially through use of this method.

Statement of obligations under allotments and other funds

[Includes only those amounts which, by Nov. 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases]

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, Agriculture (Office of Experiment Stations): Marketing research	$252,777	$267,000	$279,800
Working funds, Agriculture, experiment stations, advanced from Bureau of Plant Industry, Soils, and Agricultural Engineering: For research on plants which may be sources of the drug cortisone	4,974	5,000	----------
Miscellaneous contributed funds, Department of Agriculture (Office of Experiment Stations) (trust fund): Cooperation with National Aluminate Corp. on research and tests of chemical materials used to control weeds, Federal Experiment Station, Puerto Rico	1,212	1,341	1,300
Obligations under reimbursements from governmental and other sources: Salaries and expenses: For research work at Federal Experiment Station, Puerto Rico	15,520	11,900	11,900
Total obligations under allotments and other funds	274,483	285,241	293,000

Mr. ANDERSEN. Proceed, Doctor; and also discuss the research being conducted from transfers and reimbursements.

Dr. ELTING. The salaries and expenses item is divided into two subitems. The first provides major support for our Washington Office which is responsible for the grant fund administration and also for the overall supervision of programs in Puerto Rico, the Virgin Islands, and Alaska. The support of the Federal Experiment Station in Puerto Rico is covered as a part of the salaries and expenses item. The total is $153,100 which maintains our research station in Puerto Rico with a small technical staff of 11 persons in which we are carrying on a program of research on tropical agriculture problems of particular interest to the nation. Also it is providing a research center there

where other agencies of the Department having problems in tropical agriculture have a base of operation. In addition to the direct appropriation, there are some allotments and reimbursements from other agencies that are cooperating in that program.

TRANSFERS AND REIMBURSABLE ITEMS

You asked for an explanation of those supplemental items. There are allotments in 2 or 3 areas coming largely through the Bureau of Plant Industry, Soils, and Agricultural Engineering. One important item there is cooperative work that we are doing on cortisone-bearing plants which is a part of the total effort between the Bureau of Public Health, the Bureau of Plant Industry, Soils, and Agricultural Engineering, and our station, in which we are actually growing and making preliminary screening on a wide variety of plants that offer potentials as a source of cortisone.

We are cooperating with the Bureau of Plant Industry, Soils, and Agricultural Engineering, rather extensively in studies on rubber, particularly the hevea type of rubber in which there are many problems of physiology, pollination and fruit set and other problems in production. We have facilities in Puerto Rico in a disease-free area where a breeding garden is being maintained and supported very largely through reimbursable funds from the Bureau of Plant Industry, Soils, and Agricultural Engineering.

We also have a small trust fund of $1,300 from the National Aluminate Corp. for testing of new herbicidal materials.

That, I believe, covers, Mr. Chairman, the only supplemental items except the one major item of title II funds, that is AMA fund allotments which are made through our office for the support of marketing research in the State experiment stations on a matching-fund basis. That amounts to slightly over $250,000. That program is well established. There is an advisory committee of experiment-station people who work closely with our office and with the Administrator's office, in achieving the desired coordination of effort in this marketing field. And the States are putting up a dollar for each dollar of Federal money that is allotted so that has been one important medium for expanding our marketing program.

Mr. ANDERSEN. Doctor, your appropriation for Puerto Rico is consolidated with this item, isn't it?

Dr. ELTING. Yes, sir.

Mr. ANDERSEN. Do you intend to do that also with the Virgin Islands appropriation?

Dr. ELTING. We certainly would want to follow the wishes of this committee in that respect. We have felt that at least until the Virgin Islands program was well established and the committee was satisfied with the activity that there were advantages in keeping it as a separate item although I envision eventually that it might be desirable to consolidate it into our "Salaries and expenses" item.

Mr. ANDERSEN. At this time, however, you have made no such decision?

Dr. ELTING. No, sir. We have thought it desirable in the early stages of the program to retain it as a separate appropriation item.

DEPARTMENTAL CONTROL OVER STATE RESEARCH PROJECTS

Mr. ANDERSEN. Doctor, do you have the authority to tell one State to discontinue a project since another State is already engaged on that same work? Say, for example, if Minnesota and Wisconsin are both working on the very same experiment relative to Bang's disease, do you have the right to require one or the other to leave that alone and go into another field of research?

Dr. ELTING. Certainly we do, Mr. Chairman. Our normal procedure, assuming that Wisconsin was pursuing a line of work and we received a proposal from Minnesota which on examination appeared to cover almost identically the work that was already in progress in Wisconsin, certainly our first step would be to call Minnesota's attention to the fact that here is work that seems to be so nearly identical that we believe it will answer the problem. In 9 cases out of 10, Minnesota says, "Well, thank you for that information. Obviously we don't want to pursue it if Wisconsin already is getting the answers."

It is entirely probable that the leaders in those two States would compare notes and Minnesota would so adjust their program that they could attack some other phase of it. So I think that represents a very important function in our efforts at coordination.

JUSTIFICATION FOR ADMINISTRATIVE PERSONNEL POSITIONS

Mr. ANDERSEN. Doctor, I notice from a review of your personal services that 20 out of the 68 positions in Washington are in your Administrative Services Unit, and 3 or 4 other administrative positions are included under the Office of the Chief. How do you justify that?

Dr. ELTING. May I refer that question to Mr. Brown, our administrative officer?

Mr. BROWN. We have in the office of the Chief 1 grade 7 employee and 2 grade 6 employees. Those three employees are secretaries to the Chief, to the Associate Chief, and to the Assistant Chief. They are not administrative employees in the same sense that these down in the Division of Administrative Services are. These down in the Division of Administrative Services handle the budget, personnel, procurement, property, space, records, editorial work, and all other business activities of the office.

DUTIES OF STATION DIRECTORS IN ALASKA AND PUERTO RICO COMPARED

Mr. ANDERSEN. Now, I also notice, Doctor, that the head of the Puerto Rico station is grade 14, while the director of the station in Alaska is grade 13. Why the difference?

Dr. ELTING. The position of the Puerto Rico director has now been made responsible for a wider area of activity. We have set up a Division of Tropical Agriculture which includes the programs of Puerto Rico and the Virgin Islands. At the time that was done, with the added responsibility there and to achieve coordination of effort between those two activities, we placed the director, Dr. Bartlett, in charge of both programs. We expanded the responsibility and he was promoted to a grade 14 position.

Mr. ANDERSEN. He does have added responsibility above that of the director in Alaska?

Dr. ELTING. Yes, sir.

Virgin Islands Agricultural Program

Amounts available for obligation

Appropriation or estimate (obligations incurred)—	
1953	$100,000
1954	100,000

Obligations by activities

Virgin Islands agricultural program—	
1953	$100,000
1954	100,000

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Total number of permanent positions		16	21
Full-time equivalent of all other positions		6	6
Average number of all employees		21	25
Average salaries and grades:			
General schedule grades:			
Average salary		$4,020	$4,038
Average grade		GS–5.6	GS–5.6
Ungraded positions: Average salary		$900	$900
01 Personal services:			
Permanent positions		$43,088	$60,375
Part-time and temporary positions		3,120	3,744
Regular pay in excess of 52-week base		225	310
Payment above basic rates		9,667	13,371
Total personal services		56,100	77,800
02 Travel		6,000	2,000
03 Transportation of things		2,000	1,000
04 Communication services		500	500
05 Rents and utility services		1,000	1,200
06 Printing and reproduction		400	500
07 Other contractual services		1,000	1,000
Services performed by other agencies		7,000	5,000
08 Supplies and materials		20,000	5,000
09 Equipment		6,000	6,000
Obligations incurred		100,000	100,000

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year			$20,000
Obligations incurred during the year		$100,000	100,000
		100,000	120,000
Deduct: unliquidated obligations, end of year		20,000	20,000
Total expenditures		80,000	100,000
Expenditures are distributed as follows:			
Out of current authorizations		80,000	80,000
Out of prior authorizations			20,000

Mr. Andersen. Now, relative to the Virgin Islands program, we will insert pages 105 and 106 of the justifications at this point.

(The pages referred to are as follows:)

Virgin Islands agricultural program

Appropriation act, 1953	$100,000
Budget estimate, 1954	100,000

Project statement

Project: Virgin Islands agricultural program (appropriation or estimate):

1952	
1953 (estimated)	$100,000
1954 (estimated)	100,000

STATUS OF PROGRAM

The Agricultural Appropriation Act for 1953 includes funds for the initiation of an agricultural research and extension program in the Virgin Islands, as authorized by Public Law 228.

In accordance with this legislation, technical and administrative personnel have been employed, office and laboratory facilities have been secured through lease from the Virgin Islands Corporation, and a new program has been initiated.

The specific research undertakings to be given first priority have been determined and studies are being initiated on fruit and vegetable crops, improvement of sugarcane, forage improvement, improved pasture management, weed-control practices, social and economic studies aimed at improving rural life of the population, and establishment of 4–H Clubs. Special surveys are now in progress by specialists temporarily detailed to this program by the Bureau of Agricultural Economics and the Bureau of Animal Industry to determine further specific areas where emphasis should be placed.

DEVELOPMENT OF PROGRAM

Mr. ANDERSEN. Do you have a short general statement?

Dr. ELTING. This program is in its first year of operation, Mr. Chairman. We discussed very frankly with this committee a year ago the problems that we foresaw in initiating a program of research and extension in the Virgin Islands.

When the appropriation was made and we became responsible for the program, we moved as promptly as possible to secure a suitable location for headquartering such a program and in effecting an organization.

Our next step, one of providing administrative leadership, was to expand the responsibilities of our director in Puerto Rico to make him responsible for the total program in the Caribbean area which we feel will effect substantial savings in overhead costs and take fullest advantage both of facilities and of experience in that area. We have had very satisfactory negotiations with the Virgin Islands Corporation which we explained would be highly essential to the success of this program.

We have been able through an agreement with that corporation to find a very suitable site, a tract of 60 acres of land with a residence on it that was converted most satisfactorily into an office and headquarters building and there are two additional buildings which provide good storage, laboratory, and work space. We have negotiated the use of that property through a lease with the Virgin Islands Corporation which provides for the payment to the Corporation of $100 per month for the use of that property and the agreement provides that the Department may exercise the option of purchasing that property at any time over a period of 5 years at a cost of $25,000, if Congress should see fit to authorize that action.

Mr. ANDERSEN. Will you describe the current program in the Virgin Islands in some detail for the committee?

PERSONNEL REQUIREMENT

Dr. ELTING. The program as we have been able to develop it up to this point first involved the securing of staff. We have recruited 5 technical personnel, 1 technical aide, and 2 stenographic and clerical people. That comprises our staff at the present time. The 5 technical persons we have employed include 1 soil scientist, 1 agronomist, 1 horticulturist, 1 man and 1 woman extension worker. Those two extension workers are Virgin Islanders. The other three technicians were recruited on the mainland.

FIELDS OF STUDY

We have already initiated considerable plant work in the field of crop-variety tests, including grass and forage crops, sugarcane varieties, a number of fruit and vegetable crops, simply attempting there to determine most adaptable varieties.

Mr. ANDERSEN. You are sticking closely, are you, to the best things for the Virgin Islands?

Dr. ELTING. Strictly so. In other words, we envision this totally as a program for the benefit of the Virgin Islands. Our extension program has been largely, to this point, one of work with 4–H Club members and work with the rural villages of farm workers where their living conditions were deplorable. We have a very effective woman extension agent there that already, I think, is showing that perhaps if we can rehabilitate one or two of those rural villages there is a possibility of improving a living condition there that is most deplorable, as we found it.

Mr. Chairman, I should add one thing, that in addition to the permanent staff, there are three individuals assigned to make more general survey types of studies to try to help us find the way our program should be directed. One of those was an animal-husbandry specialist, one a farm management specialist, and one a marketing man. Those men spent from 1 to 2 months on the island and we now have their recommendations. We feel that that was a very effective way of trying to get a clear appraisal of some of the problems before we employed full-time men. So we think that will help us set our sights more effectively.

PROGRAMS OF INTERIOR AND AGRICULTURE DEPARTMENTS COMPARED

Mr. ANDERSEN. Just how does your program differ from the one formerly operated by the Interior Department?

Dr. ELTING. The Interior program was largely one of personal service and limited extension activity with no research whatsoever. We have felt that the first approach must be on a simple program of research that would show the practices and the crops that are adapted and then an extension program that would attempt to get those practices into operation. So I think we have——

Mr. ANDERSEN. To do the most good for the most people in the shortest possible time?

Dr. ELTING. Definitely so. We will insert a statement to point out how this is being approached.

(The statement follows:)

Current Program

The agricultural research and extension program in the Virgin Islands is focused specifically on raising the level of living and productivity of the people of the islands, particularly those who make a living from the land. For that reason it has been necessary to pay particular regard to the current status of these people and plan the research accordingly. One of the first activities is to secure a knowledge of the soil resources and the cropping potentialities of the farms of the islands. Interest in the program is indicated by the fact that the small farmers are making inquiries as to better management practices, including particularly the use of fertilizers, which will permit them to realize the most from their soil with the crops they are now growing.

Experimental work is being undertaken on introduction of essential food and livestock feed crops involving plot tests, adapted varieties, and on water and fertilizer requirements and other management practices. In view of the fact that a rather high percentage of the food consumed locally is imported. these introduction tests based to a large extent on research in Puerto Rico are concerned with vegetable and fruit crops such as tomatoes, potatoes, tropical sweet corn, papayas, bananas, avocados, plantains, and the like. The islands are very dry during a large part of the year so that Puerto Rico results are not wholly applicable. These experiments are being set out in demonstration plots organized to make maximum use of available soil moisture so that farmers may see what crops can be grown and how they are best managed. Most of the small farmers have a few goats, pigs, and maybe a cow or two. Feed is an important item in realizing anything from such livestock. Introductions of pasture forages are being tested in demonstration plots which the farmers can see and appreciate the value of. Some testing of improved sugarcane varieties from Puerto Rico and elsewhere is also under way since sugarcane is the small farmer's chief cash crop. The forage introductions are also of interest and benefit to the larger livestock raisers. Our program cannot go into the fundamental details of animal nutrition research but we hope through cooperation with some of the livestock producers to determine which of the pasture-crop introductions and other field crops which we are able to grow under the prevailing conditions of soil and low moisture will result in the best livestock feed for the islands. The small farmers raise ducks, chickens, and turkets, and feed must be produced for them locally. Introductions of such crops as pigeon peas and mung beans which poultry will eat directly from the plants already has been of aid to small farmers. They also run goats and pigs in the pigeon peas and mung beans and the whole plants are thus utilized as livestock and poultry feed.

Weed and brush control particularly in pastures is a serious problem for both small and large farmers in the islands. Experimental demonstrations of weed-control practices developed at our Federal station in Puerto Rico have already been of benefit to Virgin Islands farmers.

Since authority and responsibility exists in law to conduct an extension program also it has seemed best to combine the two activities at what might be called the experimental demonstration level as being the procedure which would contribute the most to the benefit of the farmers and would also make the best use of available funds and facilities.

Many of the small farmers live in villages adjacent to their land and have part-time employment other than working the land. Part of our extension program has been focused toward raising the level of living in these villages through health and cleanup programs in which the farmers themselves participate. We have one demonstration village close to the experiment-station grounds where cleanup and other health programs are carried on together with small gardening demonstrations for food production. This is attracting considerable attention from neighboring villages where these practices are being initiated. We have been assured by several of the small farmers, most of whom are men well past middle age, that they are ready and willing to work to improve their living status if we will show them what to do and how to do it. That is what we are endeavoring to accomplish in this program.

While this program is just beginning to get under way and is necessarily limited in scope to date, it is anticipated that the experimental demonstration program will eventually establish sound practices which will be carried to the farmers through an expanded extension effort to accomplish the greatest good to the greatest number of people.

Mr. ANDERSEN. What results are you obtaining so far, if any, with respect to the village you mentioned?

Dr. ELTING. That is one where we have some very tangible evidence.

Mr. ANDERSEN. However, are you concentrating on that particular village to show the other people of the island what can be done?

Dr. ELTING. We are looking on that as a demonstration area.

Mr. ANDERSEN. Are you justified in getting in there and doing social work?

INCREASING PRODUCTION OF FOOD

Dr. ELTING. With that there is an accompanying program of food-crop production through home gardens and that sort of thing, that is part of that total effort.

Mr. ANDERSEN. What are future prospects of agriculture in that area, Doctor?

Dr. ELTING. I would say the future there is one of approaching a greater degree of self-sufficiency. I don't look upon it as an exporting area in any large sense with the possible exception of cattle and sugar. We do think that the cattle production in the drier portion of the island could be developed into a fairly substantial export business. It is very largely a problem of more fully exploiting the local markets there where today far too high a percentage of the food needs of the island are coming from British Tortola and other areas. We feel there is an opportunity to largely put the island on a self-sustaining basis as far as food supply is concerned.

COMPARISON OF EXPENSES, 1953-54

Mr. MARSHALL. Mr. Chairman, before you leave that, I have a question on justification on page 105 included in the record. You are asking for $100,000 for 1954 and you purchased an automobile in 1953 out of that appropriation. Do you show a decrease and if so where do you show it?

Dr. ELTING. As I understand your question, sir, we have deleted the language which a year ago permitted the purchase of a car, because the car has been purchased and we don't expect to purchase another one in 1954.

Mr. MARSHALL. You show the decrease of the language but you do not show a comparable decrease in the amount of money you are requesting?

Mr. ANDERSEN. The estimate is for the same amount as appropriated this year.

Dr. ELTING. The fact is that we expect to have a somewhat larger staff for 1954 because we started from scratch and we got our first people down there in September, so we will definitely offset any expenditure there and have a higher cost for personal services, since they will be on a full-year basis in 1954, and they were not on a full-year basis in 1953.

Mr. ANDERSEN. You figure that would offset the money that you spent for the car?

Dr. ELTING. Yes, sir; considerably more. We hope also, certain other expenditures that have been necessary this year in adapting our physical plant there for use also will not be recurring items and

that that money which of necessity has gone more into development of a plant and getting some equipment this year, next year will be applied to personal services. In other words, we literally started from scratch there last July 1. We found virtually nothing in the way of equipment that we could transfer from the old Interior program. We did secure some office equipment, that is practically all, and the old headquarters was so badly deteriorated that by mutual consent, we didn't attempt to utilize it. We moved into a new location which is far more suitable and in better condition.

EXPANDED PERSONNEL REQUIREMENTS

Mr. MARSHALL. Your answer is then that, as I understand it, that while you do not need money for the purchase of another automobile, you do need the amount of money which the year previously was used for an automobile for other purposes?

Dr. ELTING. For other purposes, primarily personal services.

Mr. MARSHALL. You are not using that for the purpose of creating any new position or additional work outside of what you had originally planned for?

Dr. ELTING. As I explained, we didn't fill all of the permanent positions we had hoped to this year because we felt it was necessary to carry out certain surveys on a part-time, short-time basis so we are in the process now of employing one additional staff member. That, as we envision it, will be the extent of the permanent staff that we can carry at this level of appropriation.

Mr. MARSHALL. There is one other question I want to ask. You talked about not filling positions. Out of your previous appropriation of $100,000, are you going to return part of that to the Treasury unused because these positions were not filled?

Dr. ELTING. I attempted to explain, Mr. Marshall, that we have had relatively high expenses this year, and this is the first year of this appropriation. In other words, last July 1, we started this program with practically nothing on the ground to start with, so we have expended a relatively high proportion of our appropriation this year in equipping a plant, establishing our headquarters, and otherwise getting a base of operation and our personnel has been recruited over a 6-month period. All of that personnel will be on a full-year basis next year, and while the estimate remains the same, we expect that we will have expended the $100,000 this year to establish the physical facilities essential to the program with a considerably smaller portion of that total going for personal services than will be expended in 1954 when we have built our personnel up to what we consider is the proper operating level under this amount of support.

Mr. ROBERTS. There is a schedule here, Mr. Chairman, that may answer Mr. Marshall's question.

RESEARCH RESULTS

Mr. HORAN. All of the moneys we have been talking about here are primarily for research projects and administration, are they not, in your budget?

Dr. ELTING. Yes, sir; entirely so.

Mr. HORAN. Of course, there are payments to States but presumably that is for comparable or cooperative work.

Dr. ELTING. That is for direct work; that money that is allotted to the States is expended under their direction.

Mr. HORAN. What always interests us is what results we are getting from moneys we have spent for research and how extensive those results are; that is the final object of all research. In some way or other, we do not get too much of that in too much detail.

Dr. ELTING. That is a difficult thing to present, you appreciate, Mr. Horan. I gave you a few statistics on the volume of publications that simply is one measurement. It does not measure the significance.

Mr. HORAN. That makes it available to people who might apply the results of research?

Dr. ELTING. Certainly it does. We publish, and it is prescribed by law, an annual report on the activities. This one is for the fiscal year 1951, and our report for 1952 is now in galley form, and we will certainly be glad to supply this committee with copies of the 1952 report as soon as it is available.

SURVEY OF COMPLETED RESEARCH PROJECTS

Mr. HORAN. How do you determine when a research project has reached its point of no return or when you run out of any useful work in that field? You do terminate—and the gentleman from Mississippi asked for a list of projects that have been terminated for this year.

Dr. ELTING. There is traditionally about a 16- to 18-percent turnover in projects annually which means that the average life of a project is in the neighborhood of 6 years. You asked how we determine. Certainly, that is one of the functions of this on-the-ground examination we make in our interviews with the project leaders. It is not uncommon through that process to require that a project no longer receive grant-fund support. If there is a little cleaning up to do, frequently a project in the last year or so of life may be transferred over to a small amount of State support to complete it. So that sort of adjustment takes place constantly, and it is handled systematically by the fact that each station presents on July 1 of each year a complete program of projects to be supported. There is that opportunity for annual review and approval. If there are projects included on that program that in our judgment have reached the point of diminishing returns, we then work with the Director and we ask that those projects no longer be included on the program. That is part of our annual program examination and review.

Mr. HORAN. Is this presumed to be the annual report reflecting on what you have just said?

Dr. ELTING. To a considerable extent. That, of course, cannot be comprehensive when you realize that we are dealing with 10,000 lines of work. I think in that report there are some 800 separate brief progress reports indicated which is less than 10 percent but it does attempt there to pick the highlights, things that have reached the point of application or are of such interest that it will be helpful to the public. Within the limits of space, we can only hit the high points in that report.

COOPERATION WITH STATES IN RESEARCH

Mr. HORAN. Do you have any jurisdiction whatsoever over the work done in the States and do you have any jurisdiction over the work being done among the States? In the case of the air sac disease, you indicated about 7 or 8 States were engaged in various phases of the work. Is that relationship increasing, deteriorating, or becoming more cooperative?

Dr. ELTING. Certainly it is not deteriorating. I think there is gradual extension and improvement in our cooperative relations. That is something that has developed over half a century so that many of our patterns of operation are well established. I am sure that Dr. Shaw has pointed out that the volume of cooperative work carried on by each of the bureaus is greatly enhanced by their ability to take advantage of the physical facilities and other facilities existing at the State stations to enhance the total program. So far as our jurisdiction——

Mr. HORAN. To get this specific, suppose you had a very headstrong president of a land grant college and he wanted to conduct the whole program this way or that way. Is it up to Congress or a segment of Congress to change that direction or can you do it administratively?

Dr. ELTING. There are some things we can not do administratively. In the first place, we exercise no direct control over policies of the land grant colleges. They are autonomous institutions.

Mr. HORAN. They have done a great work. I am a graduate of one of them myself.

Dr. ELTING. As I explained before, I think the whole key to our ability to develop integrated programs has been one of cooperative effort. Admittedly we run into problems where negotiations bog down at times because of prerogatives on either side, but despite any problems in that area, the volume of cooperative effort has continued to grow, our mechanism for dealing with it has been improved, especially through the better organization among the directors themselves.

COOPERATION BETWEEN SEGMENTS OF GOVERNMENT

Mr. HORAN. That leads me up to two things. We have the Hoover Commission reports which indicate that if we had better cooperation among various segments of the Government, both between departments and intradepartmental, we could save money. Task forces went to some length to find facts and make recommendations. Among other things they suggested county and State councils, and I think that they inferred that there would be some discretionary power at the county and the State level.

Then we had Secretary Brannan who put out about 18 months ago, a directive or memorandum, No. 1278. I thought it was in the right direction because it outlined the fields, in conservation at least, where duplication or conflicts at the field level might occur. My only criticism of it was that he left it headless at the field level so that important decisions would have to be made by the Assistant Secretary of Agriculture, who was designated inferentially at least as the man to make those decisions.

With that before us, my question is, I assume you are still operating under 1278?

Dr. ELTING. I believe I am correct that 1278 still is in effect.

Mr. HORAN. Has the new administration made some recommendations in the future to strengthen this? Is there that possibility?

Dr. SHAW. As far as I know, it is in effect.

Mr. ROBERTS. As far as I know, the provisions of Secretary's Memorandum No. 1278 which provided for closer cooperation between the ACP, the Forest Service, and SCS programs is still in effect. A Secretary's memorandum was issued within the last 10 days which deferred further consolidation of offices at State and county levels until the matter can be further considered by the new administration.

Mr. HORAN. At least it is a very distinct possibility that before we finish our hearings we may have some additional information or memorandums regarding the strengthening of the administration of all these programs at the county, State, and Federal level?

Mr. ROBERTS. Whether there will be such an order issued before you complete your hearings, I do not know. I am sure that from statements already issued by the Secretary he intends to have a study made of that whole area. But as far as I know, the results of such a study will not be ready before this committee completes its hearings.

Mr. HORAN. I would like to point out that it is very difficult for Congress to administer a department, and I have no stomach for it whatsoever. We can, of course, express our opinions in our report. We can cut funds; we can enlarge funds. But by and large the responsibility rests with the administrators, and then if we can help you by changing the nature or the wording of statutes, that is our job.

EXPERIMENT STATION DIRECTORS REPRESENT RESEARCH ADMINISTRATOR ON STATE MOBILIZATION COMMITTEES

Dr. ELTING. Research has not as direct a relation in those several programs, of course, as Extension and some of the action programs but one very significant thing occurred in connection with the putting of Memorandum 1278 into effect. The research administrator felt that the Department's relations with the State experiment stations were so intimately developed and on such a coordinated basis that he saw fit to designate the State experiment station director in each State as his personal representative on the State mobilization committees which were set up as the State coordinating body to deal with this problem. So that so far as research is concerned it seems to me that there was a good relation between the research administration of the Department and the State experiment stations to cope with that problem.

Mr. HORAN. I want to say this, that our chairman has done a beautiful job of pointing out that we are considering funds, that they are very very closely related in a lot of fields, particularly the ones he has put into the record and those are the things that concern this subcommittee and I am glad that they have been very well covered up to now.

Dr. SHAW. Mr. Horan, there is one point there. We do have authority to withhold funds from any State that we find is not properly expending them. We have that authority in law.

FARM POPULATION OF STATES DETERMINES FEDERAL RESEARCH AID

Mr. HUNTER. Being a new member of the Appropriations Committee and not yet fully initiated into the mysteries of Government finance, some of these things have puzzled me. I was looking over this chart here which shows the comparative distribution of Federal funds to States for agricultural research. I notice that California, which is second in the Nation in population, second in the Nation in area, and first in total value of agricultural products, receives approximately one-third less than such a State as North Carolina. How is that explained?

Dr. ELTING. That reflects, according to the census, the relative rural and farm populations in the several States. We are wholly dependent upon the data obtained from the Census Bureau, in making this distribution.

Mr. HUNTER. That is the answer?

Dr. ELTING. Yes, sir.

Mr. ANDERSEN. You have no leeway there?

Dr. ELTING. We have no discretion whatsoever in that. That is by formula prescribed in the acts.

DETERMINATION OF AREA OF RESEARCH

Mr. LAIRD. How can you get the experiment stations to put emphasis in their experimental work on a phase of agriculture that really needs research work done on it? Do you follow what I mean? In the dairy industry, we find that we have a big surplus problem as far as the production of butterfat. Now, perhaps we should be working toward cows that produce a lot of milk, but not as much butterfat. Can you influence that in any way?

Dr. ELTING. The authorization in the act makes it quite limited as to what we can do to influence the areas of research. The language in the Hatch Act states that the Secretary of Agriculture shall from time to time suggest important lines of work to the States. The Bankhead-Jones Act says the Secretary of Agriculture shall encourage the entering into what he conceives to be important lines of research. You see, that is not very strong language in terms of legal authorization. So the fact is that initiation of work under these programs rests very largely with individual States. The State experiment station director is the man we look to to determine what shall comprise his total program under grant fund support and it is through the submission of projects, through our annual review on the ground, and through his annual submission of programs of work that we are able to exert some influence as to character of work which shall be included. But it must be remembered at all times that we are talking here about roughly only one-fifth of the total program. In other words, there are over $4 of State money for every Federal dollar here. So our efforts in that direction are very largely through cooperation, encouragement, suggestion, some authority certainly to reject projects that are for one reason or another inappropriate but ve y largely through cooperative effort are we able to influence the trend of these programs.

Mr. ANDERSEN. Doctor, if Mr. Laird will permit, right along that line. If there was some way in which you could help to divert experimentation to the most pressing problems at hand, it would certainly be of help to agriculture. For instance if you could divert experimentation to the current problems of butter surpluses, so that perhaps we could turn production of our dairy cows into some other commodity it would be of immeasurable benefit to the dairy farmers.

Mr. LAIRD. What is in the back of my head is that there is not money being made on the milk market today, but it is made with what used to be considered byproducts. In the non-fat solids there is money being made.

Mr. ANDERSEN. You feel that Dr. Elting in his position could perhaps help to influence at least further research?

Mr. LAIRD. We spend on dairying out of this total research appropriation about $578,000 for the entire year. That is your estimate here for State agricultural experiment stations for 1953. Then I look over at the Commodity Credit Corporation budget and I see we are spending up to $2 million in a single day on butterfat and it makes me just wonder about this program. That is why I asked the question.

Dr. SHAW. Mr. Laird, there is one other point that I think bears on your question. We have organized with the States and the Department many technical research committees and on those committees there will be a member of the Office of Experiment Stations staff and through participation in those committees we do help to guide and direct work on to the important problems.

Dr. ELTING. I am glad you mentioned that.

Mr. LAIRD. I have no further questions, Mr. Chairman.

Mr. ANDERSEN. Very well. We will recess until 9:30 tomorrow morning, gentlemen.

RESEARCH ON AGRICULTURAL PROBLEMS OF ALASKA

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$268,000	$270,000	$270,000
Unobligated balance, estimated savings	−1,137		
Obligations incurred	266,863	270,000	270,000

Obligations by activities

Research on agricultural problems of Alaska:	
1952	$266,863
1953	270,000
1954	270,000

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Total number of permanent positions	42	38	39
Full-time equivalent of all other positions	6	4	4
Average number of all employees	30	29	30
Average salaries and grades:			
General schedule grades:			
Average salary	$4,847	$4,910	$4,926
Average grade	GS-7.6	GS-7.6	GS-7.5
01 Personal services:			
Permanent positions	$120,347	$122,886	$127,386
Part-time and temporary positions	22,227	20,600	20,600
Regular pay in excess of 52-week base	642	741	714
Payment above basic rates	28,127	28,900	30,300
Total personal services	171,343	173,100	179,000
02 Travel	7,921	9,400	9,400
03 Transportation of things	8,515	8,000	8,000
04 Communication services	1,190	1,600	1,600
05 Rents and utility services	15,274	17,000	17,000
06 Printing and reproduction	1,291	1,500	1,400
07 Other contractual services	9,857	13,000	13,000
Services performed by other agencies	4,365	4,500	4,500
08 Supplies and materials	43,389	38,300	36,200
09 Equipment	10,225	8,000	7,000
10 Lands and structures		2,500	
15 Taxes and assessments	316	800	800
Subtotal	273,686	277,700	277,900
Deduct charges for quarters and subsistence	6,823	7,700	7,900
Obligations incurred	266,863	270,000	270,000

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$111,916	$42,219	$45,019
Adjustment in obligations of prior years	974		
Obligations incurred during the year	266,863	270,000	270,000
	379,753	312,219	315,019
Deduct unliquidated obligations, end of year	42,219	45,019	45,019
Total expenditures	337,534	267,200	270,000
Expenditures are distributed as follows:			
Out of current authorizations	224,993	227,000	227,000
Out of prior authorizations	112,541	40,200	43,000

Mr. ANDERSEN. The committee will come to order.

We will now consider that portion of the Office of Experiment Station's program having to do with Alaska. We will insert pages 107 through 109 of the justifications in the record at this point.

(The pages referred to are as follows:)

Research on agricultural problems of Alaska

Appropriation act, 1953	$270,000
Budget estimate, 1954	270,000

Project statement

Project	1952	1953 (estimated)	1954 (estimated)
Research on agricultural problems of Alaska	$266,863	$270,000	$270,000
Unobligated balance	1,137		
Total appropriation or estimate	268,000	270,000	270,000

NOTE.—Transfer of Federal research program in Alaska to Office of Experiment Stations. Since the fiscal year 1948, when the first appropriation was made for a Federal agricultural research program in Alaska, the Agricultural Research Administrator has been responsible for overall direction of this program. This responsibility is being assigned to the Chief of the Office of Experiment Stations, who is also an Assistant Research Administrator. The Office of Experiment Stations operates a Federal research station at Mayaguez, P. R., and a Federal research and extension program in the Virgin Islands. The assignment of this program to the Office of Experiment Stations is being made in order to place in one office the responsibility for operation of all Federal agricultural research programs in the Territories and possessions.

STATUS OF PROGRAM

Agricultural research in Alaska is carried on as a joint program of the United States Department of Agriculture and the agricultural experiment station of the University of Alaska. The university is the land-grant college of the Territory and receives grant funds under the Hatch, Adams, Purnell, and Bankhead-Jones Acts, as well as appropriations made by the Territory.

Under a joint director mutually agreeable to the university board of regents and the Research Administrator of the United States Department of Agriculture, investigations are conducted in soil analysis, horticulture, animal husbandry, agricultural economics, agricultural engineering, insect control, and field-crop improvement. These investigations have as their object increasing farm production and stabilizing the rural economy of the Territory.

SELECTED EXAMPLES OF RECENT PROGRESS

1. A new unnamed potato variety (57.44–3–46) excelling present commercial varieties in yield, size, and shape of tuber, shallowness of eye, and skin-feathering was released to the Alaska Certified Seed Growers' Association for increase. Thirty-four additional lines have been added to the potato-breeding program.

2. Varieties of vegetables, shrubs, and trees released after 3 years of research on the problem of cold hardiness have been widely adopted by suburban gardeners, homeowners, and military defense installations—all interested in any measure that promises to make more locally grown food available.

3. Records now available from the 4-year-old dairy-breeding program show already a substantial increase in milk production. A Holstein heifer produced in the dairy-breeding program has averaged 55 pounds of milk daily for the first 8 months after her first calf. The increase of milk production in most cases is directly attributable to the prompt and general adoption by the dairy farmers of the recommended breeding practices and the feeding of forage preserved as silage rather than as hay.

4. Through greenhouse pot tests, the importance of phosphates in plant nutrition in Alaska has been found to be of much greater magnitude than indicated in earlier field plot studies.

5. Sprinkler irrigation of grass pasture and truck crops was found economically feasible under well-designed and intensive management practices. The irrigation trials were carried out in cooperation with the Soil Conservation Service.

6. Release of seed of Golden Rain oats and Edda barley to the farmers after 5 years of trial has resulted in a substantial increase in yields per acre of these im-

portant cereal crops over older commercial varieties. Better adapted oat varieties have reduced the danger of damage from the shortage of manganese that has been noted in certain Alaska soils.

7. Preemergence chemical weed killers are proving especially valuable to the potato industry. Savings of thousands of dollars will result from the elimination of the hand-weeding practices that are so expensive under Alaska wage levels.

8. Widespread use of aldrin, dieldrin and other chemicals, recommended after 2-year field trials, greatly reduced damage by cutworms to economically important crops.

9. Field plot studies with onions and beets show that minor elements are probably not limiting factors in truck-crop nutrition under present management practices.

10. Soil research has developed methods of predicting soil and crop fertilizer requirements through new special soil-testing techniques in which soils are classified in six categories. Information as to the new testing methods has been passed on to other agencies, such as the Soil Conservation Service and the Bureau of Land Management (Interior Department), interested in improved methods of land classification.

Mr. ANDERSEN. Dr. Shaw, who would you like to have make a general statement on this item?

Mr. SHAW. Dr. Mick.

Mr. ANDERSEN. Dr. Mick, we will be glad to hear from you. First, will you identify yourself for the record?

Dr. MICK. My name is Allan H. Mick. I am associate director of the Alaska Agricultural Experiment Station.

Mr. ANDERSEN. How long have you been there, Doctor?

Dr. MICK. I have been there approximately 5 years, being 1 of the technicians employed under the revised program in 1948.

Mr. ANDERSEN. You may proceed with your statement, sir.

Dr. MICK. Yes, sir.

Mr. ANDERSEN. We are glad to have you with us. You have come a long way.

DEVELOPMENT OF EXPANDED PROGRAM FOR ALASKA

Dr. MICK. Thank you. I would like to outline, if I may, our plant facilities and tell you a little bit about the impact of our program upon the agricultural production in the Alaska Territory. The program as has been explained in years previous is a joint program between the United States Department of Agriculture and the University of Alaska which is the Territorial land-grant college.

EXPERIMENTAL FACILITIES IN ALASKA

Our physical facilities consist of 3 experimental farms, 1 at Petersburg where experiments on the breeding and feeding of fur-bearing animals are conducted; our agricultural farms are at Matanuska and Fairbanks and at those two locations we have approximately 425 acres of cropland available of which 45 acres is in intensive plotwork. These 2 farms support approximately 125 experimental animals, which includes a herd of 7 bulls that are now used in the artificial insemination program. In addition to these three farms we have now available the Federal facilities at Palmer, which were constructed under the authorization of this committee. These Federal facilities consist of a main building which has room for 9 offices and 5 laboratories. In addition, we have a greenhouse and an experimental cold-

storage plant. Incidentally, I would like to mention that our greenhouse still lacks a headhouse, and the experimental cold-storage plant is still lacking temperature- and humidity-control equipment.

PERMANENT AND TEMPORARY PERSONNEL

The personnel of our program consists of 24 civil-service scientists, 12 Territorial technicians, including 2 mechanics who are skilled in subarctic maintenance of vehicles and buildings. We have 16 clerical employees. We have 10 permanent laborers, 2 of whom are constantly on maintenance and 6 of whom maintain the station herds. We also require 10 man-years of temporary laborers in our program.

FIELDS OF RESEARCH

The organization of the research work excluding the administration the extension, and the teaching parts of the program is divided into eight departments which includes agronomy, animal husbandry, horticultural, soils and chemistry, farm management and marketing, agricultural engineering, entomology, and pathology. These 8 departments are currently working on 48 projects which are coordinated through the Office of Experiment Stations.

SOURCE OF FUNDS FOR RESEARCH PROGRAM

The support for this program that we anticipate for the coming year includes the $270,000 direct Federal appropriation item, approximately $116,000 from Federal grant funds, $154,000 of Territorial appropriation earmarked for research, and $27,000 that is derived from the sales of surpluses and from rents, which makes a total of approximately $567,000 earmarked for research. In addition, the program now includes $23,750 for extension specialists in agriculture and $18,850 for teaching technical agricultural subjects at the university. These latter two items are provided by the Territory through the university. It makes altogether, then, a total overall program support of approximately $611,000 for agricultural research, for extension of the research results to the farmers, and for teaching the technical subjects in the university. I would like to point out that of this $611,000, approximately $263,000 comes from Territorial sources as compared to only $17,500 in 1947. It indicates that the Territory is following the lead of the United States Department of Agriculture and is supporting this agricultural program to the extent of its capabilities.

One other point I would like to make, and that is that our costs are very high in Alaska and that adjusting this $611,000 to a comparable purchasing power in Oregon or Washington gives us the sum of approximately $427,000.

PROGRESS IN AGRICULTURAL SELF-SUFFICIENCY

Mr. ANDERSEN. Mr. Reporter, let the record show at this point that Mr. Horan is acting as chairman.

Mr. HORAN. Before we get more deeply into this, could you give us at this point in the hearings how far have we progressed in self-sufficiency in Alaska?

Dr. MICK. Yes, sir. To answer that statement, I will have to——

Mr. HORAN. Just give us an approximation.

Dr. MICK. Just an approximation. We think we are holding steady, sir. In other words, our increase in efficiency on existing farms is keeping pace with population increases. We are not actually advancing in self-sufficiency yet because we are against this problem of clearing additional acres. That is something over and beyond the research program, if you understand me.

Mr. HORAN. I thank you for that answer. I think that is adequate and honest. We recognize Alaska as not only one of our Territories but one of the important military outposts of ourselves and the entire free world.

Continue, Dr. Mick.

Dr. MICK. I was about to explain that the hypothesis that underlies our research program is based on that very point, that we cannot overlook Alaska's dependence on these long supply lines. Although we recognize that agriculture probably will never be the major industry in Alaska, it certainly is a very vital part of the stable economy in the Territory and must be supported for those reasons.

USING INFORMATION FROM OTHER COUNTRIES

Mr. HORAN. One of my reasons for going to Sweden in 1945 and flying into Stockholm and looking upon all of the greenhouses that surround Stockholm was to find out what they had that we might add to the economy of an integrated Alaska. Certainly we can learn things from Sweden. I came back with an armful of reports from the agricultural attaché at that time. I think we can learn a lot from Sweden because their latitude is about the same as Alaska's.

With that, I want you to continue.

Dr. MICK. We think that we are working in that direction and we would like, incidentally, to establish closer coordination with some of the Baltic States and with Iceland in particular because our conditions resemble very particularly those in the Baltic States and similar podzolic soil regions in the world. We hope that within the next 2 or 3 years we may be able to effect some exchange of technical help and thereby coordinate the program more closely with their technical advances in the agricultural field.

Mr. HORAN. Is that included in this budget?

Dr. MICK. They are not included in the budget request.

Mr. HORAN. Will you make a special point to point them out when they are included in your budget request?

Dr. MICK. I shall do that, sir.

RESULTS OF RESEARCH

I would like to review very briefly the results of our 5 years of research. There is before you our progress report for the last calendar year which goes into some detail concerning the research advances of this last particular calendar year. You will notice in looking over that publication that it is in a very peculiar form—peculiar is not exactly the word. It is in a form prescribed by the Office of Experiment Stations. It is a part of their regular reporting procedure and the purpose behind it is to make sure that there is no duplication in our efforts over the projects that might be conducted elsewhere in the United States.

Briefly, what this report indicates is that one of our most important contributions to date is to show that preserving forage as silage rather than hay is a much better management practice under the environmental conditions that exist in Alaska.

Mr. HORAN. You have learned that from the Norwegians.

Dr. MICK. That is true. Our second point is that grass forage is as good or better than oats and peas. Oats and peas, however, were, before we went up there, the chief forage crop in Alaska.

Mr. HORAN. Why was that, Dr. Mick? As long as 30 years ago, we developed a 90-day wheat up around Fairbanks. Why did we go to oats and peas up there instead of forage crops which, of course, do not have to bloom and mature in order to be forage?

Dr. MICK. The reason is, sir, that before the advent of this stepped-up research program, most of the management practices were inherited from the places where the settlers formerly lived. Most of them came from Minnesota, Michigan, upper Wisconsin.

Mr. HORAN. Our early settlers in the West brought with them the practices that had been useful in Iowa, Nebraska, Massachusetts, and elsewhere in the East. So Alaska, then, suffers from the practices of inheritance rather than research.

Dr. MICK. That had been extended to the Territory. Unfortunately, the Territory differs from these lake-State regions in that it has dry springs and very wet harvest seasons and so the practices that were satisfactory in the lake States turned out to be not satisfactory or not adapted in Alaska. Yet there was no one there to really show them how to change these practices.

FERTILIZER NEEDS

A third contribution that we have been able to make is in the fertilizer field. It has always been considered as an inheritance of, I suppose, our Western migration, that virgin soils are very fertile soils. Unfortunately, in subarctic regions, that is not true. Virgin soils there are inherently not very productive and our nitrogen cycle operates at a very low level in Alaska. The soils are also young. They are high in basic elements. These basic elements interfere with the phosphate nutrition so that the very first year that a crop is planted on those soils, in order to get good yields they have to have heavy applications of nitrogen and phosphate fertilizer. That sort of thing was not a part of their experience in Michigan or Minnesota or Wisconsin and there was no way of finding it out until an intensive research program could lead the way.

One other thing in connection with crops for forage. They were trying to grow forage type oats, Climax and Victory varieties of oats. For some peculiar reason they are susceptible to low manganese supplies in the soil so they were encountering difficulty with manganese shortage appearing in the oat crop. We could get away from that by treating the soils with manganese and eliminating the deficiency symptoms and we can increase the yield of those particular varieties of oats by some 25 percent by using manganese in the fertilizer. However, a more practical approach was to find a better adapted variety and we have developed Golden Rain oats which is in commercial production. This variety does not react to the low manganese supplies in the soil.

I have here a bin sample from experimental plots of this Golden Rain variety. You will notice it is a rather small kernel oats and that particular sample has been handled in a drying experiment and in grading and sorting so that it is pretty well clipped down.

Mr. HORAN. These look almost as good as those produced in southwestern Minnesota.

Mr. ANDERSEN. I will agree to that.

STATUS OF SOIL FERTILITY

Mr. HORAN. What is the situation with regard to potash, nitrogen, and phosphate? Will you discuss the whole matter of the fertilizers in Alaska?

Dr. MICK. Our potash supplies in Alaska soils are fairly high. The reason for that is that they are very young materials. If you have experienced a summer in the Matanuska Valley, you can actually see the soil accumulated through the terrific dust storms that blow off local glaciers. That material is naturally high in potash, calcium, and manganese, magnesium, so we have no difficulty with the supplies of those basic elements. There are adequate quantities of potash present for the present level of management practices in the present state of development of the farming enterprise.

If we go to irrigation techniques, and it looks as if they will be economically feasible, then no doubt we will develop potash deficiencies and will have to supply potash in the form of fertilizers also.

Mr. HORAN. I suppose the reason is that through irrigation you tend to leach down.

Dr. MICK. We do tend to lose potash through leaching. Also, we have a much greater production per unit area of soil and the potash requirements of that crop are correspondingly higher; so in order to eliminate potash as a limiting factor under very intensive management practices we must include potash in fertilizer formula.

Mr. HORAN. At the surface.

Dr. MICK. At the surface.

With respect to minor elements with the exception of manganese under the present management practices that prevail in Alaska, none of the minor elements are limiting. There are local exceptions to that. Some attempt is being made to exploit some of the organic soils and under very local extreme conditions we have found very acute boron deficiency symptoms but they are easily corrected and we need to have no particular local research to overcome boron deficiency.

POTATO RESEARCH

In chronological order the next thing of importance we discovered was that the Alaska potato growers were spacing their potatoes far too widely in the field and as a result they were getting huge potatoes, potatoes unacceptable to the civilian market. They were accepted by the military people with reluctance. It was very simple to encourage closer spacing and by research plots to demonstrate that closer spacing of potatoes would yield a much better quality of marketable produce.

It was also brought out and has been brought out in former hearings that disease threatens the potato industry in Alaska. At one time

Alaska was fairly isolated. They were depending upon their own seed up there but ring rot and, of course, other diseases that are peculiar to the potato crop soon got a foothold so that it is necessary to practice strict disease control methods and disease prevention methods in the potato industry.

Mr. HORAN. You have a short growing season. You have a long dormant season. We want to know why these diseases are with us up there in view of these conditions.

Dr. MICK. We understand that the diseases came up with potato seed and the diseases are carried over in storage and in improper handling of potato seed. So it becomes a matter of educating farmers in the proper control and prevention methods in cutting seed, how to rogue their fields and how to recognize disease symptoms in the field. The long season in this particular case does not have any significant bearing on the incidence of disease in the patoto fields. It does have some bearing in this manner, that the planting season is very, very short. They have about 10 days in which to plant the potato crop so it makes a very sharp peak labor load in the spring. Well, naturally, the farmer is rushed and he sometimes gets careless and as a result the disease is spread rapidly so it becomes a constant fight against this rush to get their crop in, and this necessitates going slowly and using caution in controlling the diseases themselves.

Mr. HORAN. Have you made experiments with regard to fumigating the seed potatoes in any particular way to eliminate the larvae?

Dr. MICK. Not fumigating, sir, but there has been a lot of work done in the United States on disease control measures and that can be extended to Alaska. What it includes are such methods as wet materials; the potato seed is dipped in antiseptic solution is what it amounts to and the cutting knives must be dipped constantly. They must be constantly wet with this antiseptic material in order to eliminate the spread of these disease organisms.

Mr. HORAN. Have you attempted limited sterilization of the soil?

Dr. MICK. Those experiments in the United States have shown that that is not particularly practicable in control of potato diseases. So we are following the lead of such research as has been done that can be extended.

VEGETABLE INSECTS

One other aspect that we attacked after this disease problem had received our attention and that is the matter of cut worms and maggots in the vegetable crops. There are indigenous flies in Alaska that have maggots as one phase of the development of their life cycle. They normally live in the humus, organic matter in the forest floor, but they prefer such crops as mustard, turnips, and radishes. All of the root crops are very susceptible to infestation by many of these flies and the product becomes unmarketable because of a great many maggots that appear in them before harvesttime. We have discovered that many of the insecticides that have been developed in the States are effective in controlling maggots and thereby increasing the marketability of root crops and efficiency of production per acre.

INSECTICIDES

Mr. HORAN. What are those pesticides?

Dr. MICK. The best control measures are aldrin and dieldrin. Of course, there are new insecticides in the control materials that appear on the market constantly. And all of those must be tested because they react differently in Alaska from the way they do in the States. It is a matter of temperature and the activity of the organism as reflected by the temperature and soil conditions. So they must be tested individually to see how they can be applied and used under Alaska conditions.

Mr. HORAN. Have you used parathion up there?

Dr. MICK. Yes, that is effective. It is more difficult to handle, however, than the aldrin and dieldrin products which are safer for general use by the farmer.

Mr. HORAN. For the information of the subcommittee, parathion is a very lethal spray that is almost standard in my home area now. We use it through a duster, a speed sprayer.

Mr. ANDERSEN. Who is it lethal to?

Mr. HORAN. The operator. Very lethal but very volatile. It kills anything that chews or breathes that comes in contact with the dust and it lasts for a few days and then its effects are gone, leaving no troublesome residues.

Dr. MICK. If I may interrupt, that is a good example of the kind of research we must continue to carry on in Alaska. That material under your environment is volatile and disappears in a few days, but in Alaska it persists for 2 weeks or 3 weeks. If we follow the manufacturer's recommendations for the United States, it becomes relatively more dangerous to use the same material in Alaska.

Mr. HORAN. Parathion is a material that can only be used by commercial operators. It is not a material for anyone who is a window-box operator to be using.

Dr. MICK. That is correct.

MILK AND MEAT PRODUCTION

One point that has come before the committee in years past, and it still bears repetition, however, is this matter of raising dairy replacements and beef steers in Alaska. During World War I and prior to World War II, the price of milk was so high that people thought they could not afford the cost of feeding fluid milk to their heifers and calves and, therefore, most calves were killed at birth.

The farmer is getting $10.50 a hundredweight for milk. The farmer received this past year $10.50 a hundred for his milk in the Matanuska Valley. He also received $10.50 year before last. Another point that I would like to make is that we have been able to increase the efficiency of operators in the dairy industry so that the price of milk to the public has remained fairly constant despite the greatly increased demand over the past 10 years.

Mr. HORAN. Are you going to touch on the flying in of breeding stock, heifers, and calves?

Dr. MICK. Yes, I mean to go back to that point. We now are growing dairy heifers, dairy replacements, and beef products on the dairy farms using skim-milk powder as the early feed and calves can

be raised on a ration consisting chiefly of skim-milk powder for about $44 to $60 to 6 months of age. Thereafter, they can be changed over to roughage and fed up to the slaughtering or to the first lactation on local growing high protein roughage so that at the present time most of our dairy replacements are being raised in Alaska as contrasted with conditions 5 years ago when most of the cattle were shipped in.

Mr. HORAN. It has been difficult, trying to develop your skim-milk feed and livestock industry in Alaska, has it not, Dr. Mick?

Dr. MICK. Very difficult.

Mr. HORAN. You had to import the livestock itself or import the feed in many instances in order to have dairy industry in Alaska. As a result, you have your dry skim milk.

Dr. MICK. That is correct.

Mr. HORAN. And dried skim milk containers have been quite conspicuous up there?

ARTIFICIAL INSEMINATION PROGRAM

Dr. MICK. I would like to make one point about the artificial-insemination program. It has proved highly successful under subarctic climatic conditions. That is a point that required research from the beginning. Nobody was sure how artificial insemination would succeed under the particular environment in which they are operating. But it has proved very successful. We get about 85 percent conception on the first two services which is as high as any of the programs here in the States.

Mr. HORAN. Do you control the temperature of your conceived cows?

Dr. MICK. Not of the cows. We have to take very elaborate precautions to control the temperature of the semen that is used. It has to be watched very carefully, especially in the wintertime when the operator may have to take it from the warm barn out into 30–40 below weather. Elaborate precautions are necessary to make sure that the temperature does not change before it gets to the cow.

Mr. HORAN. It has proved to be quite successful when the temperature is around 65 degrees Fahrenheit.

Dr. MICK. That is approximately where they hold it. About 80 percent of the dairy farmers in the Matanuska Valley are now cooperating in this artificial-insemination program. As far as we know, there are only three bulls, aside from our herd that we use in the artificial-insemination program, that are used by the dairy farmers in the valley.

I doubt that a bull association will ever develop in the country.

WEED-CONTROL RESEARCH

The final field in which we have been able to make great advances is in the field of weed control by chemical measures, and there again we have peculiar environmental factors that are different from environmental factors in the States, and we have to investigate each one of these chemical weedicides as it comes on the market and adapt it to local conditions; but they are very effective in Alaska if used properly.

Mr. HORAN. What type do you use?

Dr. MICK. It depends on the technique. We are right now emphasizing preemergents. Those are used early in the potato industry.

For example, after the potato has been planted but before the shoots emerge the chemicals will give very good control of our two principal pests, lamb's quarter and pigweed.

Mr. HORAN. What governs the time of application of weedicides? Would it have a relation to sap flow from roots to plant tops?

Dr. SHAW. There is a good bit of variation between the species of the plants and their life cycle. You have got to catch it just at the right point and, as you say, it will differ in trees as compared to grass. There are also differences in terms of weather conditions, particularly moisture and temperature, and we haven't got as much information as we need. Chemicals have been used successfully one year by a few farmers, and then the next year a good many of them use it and may have very disappointing results because of the fact that you have a different weather condition the second year than you had the first. We are having to do a lot of experimental work to try to pin these points down so that we can get some satisfactory recommendations. I think there are many possibilities in the preemergence treatment as well as the postemergence, but I do not think we are in a position where we can furnish the farmer all the answers as yet.

Mr. HORAN. I think probably we can say that, in the case of annuals, what you have to deal with is contact treatment that will destroy the growth of the plant, whether it is broad leaf or fine leaf or a needle leaf.

In the case of perennials, as trees, you have to follow the sap movement either up or down. The reason why August and those periods in the year are effective is because if you can mix something in sap which the tree normally takes down into its root system during the dormant season that will destroy life in the roots, you have destroyed the plant. That is a field that is, I trust, being looked into by the Research Administration.

Dr. SHAW. Yes, sir; we are so doing.

Dr. MICK. Weed control is very important in Alaska. We have no source of cheap labor in Alaska. There is absolutely no labor such as you think of in the States available for farmwork.

Mr. HORAN. The Eskimos were not farmers?

Dr. MICK. And of course they live in areas outside the potential farming areas. So that we have to depend on high-school students or women or seasonal laborers that come to work for a contractor and are disappointed momentarily and hang around to wait for a better job. But it is necessary, usually, to pay from $1.90 to $2.25 an hour to hoe potatoes, for example.

PROBLEMS IN AGRICULTURAL DEVELOPMENT

Mr. WHITTEN. Dr. Mick, earlier the chairman asked you with reference to how close Alaska is to being self-supporting. I believe that you said that you were making considerable progress.

Mr. HORAN. No; holding their own.

Mr. WHITTEN. Farm production is making considerable progress insofar as the total production is concerned, but with increased demands and population growths, you are just barely holding your own. What percentage?

Mr. HORAN. About 30 percent?

Dr. MICK. No, sir; not that high. The figures that have been quoted were 15 percent estimated by the task force committee in 1946.

Mr. HORAN. Not quite as high as I thought.

Mr. WHITTEN. So you are holding your own. Now, in the absence of this research, would that percentage be going down due to the increased population and the demand?

Dr. MICK. I have no doubt, sir, after being there for 5 years and seeing how that operates in Alaska, that there would have been very few farmers left by this time if it had not been for this research program.

ECONOMIC ASPECT OF ALASKAN AGRICULTURE

Mr. WHITTEN. Now, Mr. Horan has pointed out very well indeed that the latitude, the climate, climatic conditions, are similar to those of other countries throughout the world where they have been perhaps more successful in meeting their needs than they have in Alaska. But in those other countries necessity has dictated that development to some extent. That is all the country they had. Alaska's relationship to the United States is such that in the foreseeable future they will never face the exact situation that Sweden and these other countries face. In the absence of that, can you foresee that they would ever become more than, say, 50 percent self-supporting?

Dr. MICK. No, sir; that is a very difficult question to answer.

Mr. WHITTEN. I realize that. I am trying to see where the ceiling is.

Mr. HORAN. Alaska suffers from being an appendage of the United States, and she waits on us to help her. On the other hand, Sweden has had cooperative forestry since the year 1268. They had to. They were there. They were a people. They were on their own. And since they had to do it, they did it in self-preservation. And what we are trying to do, and I hope you are trying to do, is develop techniques that will enable the individual farmer at least in Alaska to feel that he has a chance and that he is more or less on his own. The question that my colleague asked is very vital at this point because it does point up what we are trying to do through this subcommittee to help Alaska to help herself.

Dr. MICK. That question, sir, has worried us a good bit. I think there is one point you touched on that is rather generally overlooked, and that is that these Baltic countries, the Scandinavian countries, developed primarily as an agricultural-social economy. The impact of the industrial revolution on that agricultural economy has been very marked and has converted them from self-subsisting nations to nations of importers, largely.

Alaska has developed after the advent of the industrial revolution. Today, a very small portion of our population is actually engaged in farming. When the western United States was settled, most of our people were farmers. That was a way of life and a method of making a living.

Mr. HORAN. They say that during World War II Denmark was conquered by land, Norway by sea, and Sweden by telephone—to show you how dependent they are on the rest of the world.

Dr. MICK. That is very true. This impact of the industrial revolution on our whole social scheme is a factor in the development of our Territory at the present time because we have——

Mr. WHITTEN. I suppose you could point out that, even if you could increase the production, from the standpoint of economic production it would not be to her advantage to try.

Dr. MICK. That is correct.

Mr. WHITTEN. It would also be to Alaska's interest to import many things due to the difference in what you could import them for and the cost of production in Alaska.

Dr. MICK. The people could survive on a potato and meat economy but under the present scheme of things we no longer accept that level of subsistence. Under present dietary habits I doubt that Alaska will ever grow more than 40 percent of her food needs; 45 percent would be the highest. We can't grow sugar; fats and oils probably will never be produced in Alaska. Very few fiber crops can be grown in Alaska; and of course none of the citrus crops.

Mr. HUNTER. You cannot grow sugar beets?

Dr. MICK. It is possible to grow sugar beets but whether it is advisable to encourage a sugar-beet industry is a different matter because even in the lakes States the sugar-beet industry is rather an artificial sort of an industry.

Mr. HORAN. What you would have would be a potato-beet industry, because it would not have time to change from starch to sugar; is that not true?

Dr. MICK. They have had beets there, sir, on an experimental basis that have had a very high sugar content.

Mr. HORAN. Very interesting.

POPULATION TRENDS

Mr. MARSHALL. Before we leave this, Mr. Chairman, there are just 1 or 2 points. The population of Alaska has increased percentage-wise about how much in the last 5 years?

Mr. MICK. It has increased. I have a table right here, sir, that maybe you would like to place in the record.

Mr. HORAN. We will include it in the record here.

(The table referred to is as follows):

Estimated civilian population in the rail belt of Alaska, 1939–50

1939 (Oct. 1)	25, 000	1946 (July 1)	56, 000
1940 (July 1)	26, 000	1947 (July 1)	70, 000
1941 (July 1)	27, 000	1948 (July 1)	78, 000
1942 (July 1)	80, 000	1949 (July 1)	80, 000
1943 (July 1)	102, 000	1950 (April 1)	75, 000
1944 (July 1)	80, 000	1950 (July 1)	83, 000
1945 (July 1)	60, 000		

Dr. MICK. This shows the population increases in the rail-belt area which is the principal marketing area for agricultural produce and in the last——

Mr. MARSHALL. Over the longtime view, there will be a lot of development in Alaska?

Mr. HORAN. In a short time, we have stimulated a growth of population through defense programs and so on.

Dr. MICK. That is right.

Mr. MARSHALL. And what position are agricultural people going to be in if there is a dropping off of that that would force people who are presently engaged in these defense construction activities back on to the rest of the economy? Will they settle on the land, is that what they will do? If not, what will they do?

Dr. MICK. No, sir. I think a great part of the population that is currently engaged in the construction program consider themselves only as transient residents in the Territory and they will leave the Territory and go someplace else but we see no prospect of a great decline in marketing possibilities in Alaska.

Mr. MARSHALL. My question, though, is that, generally speaking, in periods of a declining employment agriculture is called upon to absorb a greater proportion. That is historically true. Do you feel that would not be so in Alaska?

Dr. MICK. We believe that trend will be true in Alaska but it will not take care of the entire population that is now involved in the construction phase of the defense program. The termination of that program or dropping off of that program will increase the pressure for people to return to the land. To put it in a little different way, right now there is very little incentive for people to become farmers in Alaska because of the great incentives in the building andconstruction and contractual businesses. Therefore, they migrate to those higher-paying enterprises and that tends to keep them off the farm. With the termination of this building program in Alaska, those pressures and trends will be removed and then we will see, I think, a greater strengthening of the farming as such.

Mr. MARSHALL. Are the people in the experiment station making some plans to temporarily assist this——

Dr. MICK. We are taking very active steps in trying to envision that transition period and we are working very closely with the labor unions in Alaska and the chamber of commerce people who are vitally interested in this transition period that seems to be approaching in the next few years.

INCREASES IN EFFICIENCY OF PRODUCTION IN ALASKA

Dr. MICK. If I have just a few more minutes, I would like to summarize all of these advances. The purpose of this table is to show the increase in efficiency of production in Alaska. If I may refer to the last line first, you see there the increase in farmland in production from 1944 to 1952 of 40 percent. From the period 1944 to 1950, we had a 16 percent increase in cleared land farmed in the Matanuska Valley. In the next 2-year period, 1950 to 1952, there was an additional 24 percent of cleared land that went into crop production in the Matanuska Valley.

You can get some idea of increased efficiency of production by comparing that with actual increase in products grown upon that land and marketed. Milk, for example, increased in production a total of 142 percent from 1944 to 1950; and we had an additional 79 percent increase during the period 1950 to 1952.

Mr. HORAN. At this point, I would like to put this statement in the record.

(The table referred to follows:)

Impact of research program on Alaska farming evaluated in terms of increases in selected farm products sold in the Matanuska Valley and compared with increases in land farmed (1944 used as base)

Item	Unit	Unit	Sold in 1952	Percent increase in production during period 1944–52
Milk	pounds	1,000	5,777.0	221
Eggs	dozen	1,000	125.9	434
Poultry, dressed	pounds	1,000	180.0	5,085
Beef, dressed	do	1,000	93.9	53
Potatoes	tons		4,923.0	133
Carrots	do		67.5	356
Cabbage	do		143.9	82
Land cropped	acres		12,500.0	40

NOTE.—This tabulation shows that production per acre of land cropped is rapidly increasing. The factor of efficiency is directly related to research results which have shown farmers how to grow more food on less land with less effort.

Dr. MICK. The total production of milk in 1952 that entered commercial channels was 5,777,000 pounds. Eggs also have increased tremendously for a total during 1944 to 1952 period of some 434 percent. Poultry increased tremendously—dressed poultry. In 1944, there were only 3,400 pounds of dressed poultry that entered commercial channels. This last year, however, there was a total of 180,000 pounds of dressed poultry that was marketed from farms.

The potato tonnage has increased from a total of 2,100 tons produced in 1944 to 4,923 tons produced this last year which is a total increase of in the neighborhood of 133 percent.

We have increased production per unit and increased the efficiency of operations on the existing farms. That acts as an incentive for people to enter farming and will be reflected in the next 4 or 5 years, we think, by greater increases in production as more land becomes cleared.

LAND IN PRODUCTION

Mr. ANDERSEN. Does 12,500 acres represent your total agricultural producing land?

Dr. MICK. No, sir; that is only in the Matanuska Valley.

Mr. ANDERSEN. What is your total?

Dr. MICK. There are 3,000 more acres in commercial production or approximately 15,500 acres for the whole Territory.

Mr. ANDERSEN. What are the hopes of increasing that acreage in the near future?

Dr. MICK. The difficulty is the price and the capital investment required to clear that land and get it into the first crop. That is the stumbling block that we are up against and it is something that the research programs cannot contribute much to. It is a matter of developing agricultural leadership and of educating the leaders in the Territory to devise some kind of constructive program that will increase the cleared acreage. I might state that that cleared acreage in the Matanuska Valley we calculate is only a third of the acreage that could be in production with no deterioration in demands.

Mr. WHITTEN. Dr. Mick, 15,500 acres sounds relatively small but then when we match that against a total civilian population of 80,000

it shows that it is not too small if adequate production could be had from the acreage that could be used.

Dr. MICK. That is correct, sir.

Mr. WHITTEN. Considered alone, it sounds very small for the money we are spending on research. But when you look at the total population of 80,000 it is a fair amount of land per individual, if it were highly productive.

Dr. MICK. We calculate it takes 0.34 of an acre to grow those products in Alaska that are consumed per individual. If we include meat in that estimate then the per acre requirements per capita go up to about 0.75 of an acre.

Mr. HORAN. Could you enlarge upon that point for the record? I would like to have that enlarged upon by inserting in the record at this point a statement on agricultural problems in Alaska. We know that it is extensive.

(The requested statement follows:)

STATEMENT ON PROBLEMS RELATED TO THE SLOW AGRICULTURAL DEVELOPMENT OF THE TERRITORY

Major obstacles to further rapid development of agriculture in Alaska are first, the high cost of land clearing and necessary capital improvements and second, the abnormally high incentives offered by construction and service trades; and third, the very limited sources of credit available to new farmers. The lack of credit is especially constrictive for homesteaders whose undeveloped, unpatented lands are not considered as acceptable security for either long- or short-term loans. Limitations on credit for agricultural development can be attributed in part to a limited supply of loanable funds usually characteristic of frontier areas, to the large demand for such funds for supporting other lines of activity in an expanding community, and to large risks inherent to lending in a new undeveloped area. To bring more new farms into production means that some device must be found to release the homesteader from a major portion of the risks and effort necessary to develop productive enterprises.

These obstacles not only limit the pioneering of new farms, but inhibit the expansion of existing ones. Many farmers are operating at inefficient, uneconomical levels of production because of insufficient cleared land in their individual holdings. Established farmers are unwilling to assume the risks of tying up their operating funds in land clearing.

As long as risks remain at their present high levels and as long as inducements of other occupations remain relatively attractive there will be little movement to the land and little chance of increased agricultural production as a result of new farms entering commercial production.

MEASUREMENT OF RESEARCH BENEFITS

Mr. HORAN. Before I call on Mr. Hunter, I would like to ask Dr. Shaw if it is possible in any way to depict the return from our research dollar? Alaska gives us a very clear picture because we have a beginning and we have a program based upon the action of this subcommittee that shows progress based on a 5-year period.

Mr. WHITTEN. We might even say that in this case it was a benevolent action by this subcommittee.

Mr. HORAN. It does give us a bench mark, Dr. Shaw, and I wonder if it is possible at all to draw any analogy from it.

Dr. SHAW. I think we would have some difficulty in saying just what was the total benefit of research but research was the key to these increases that have come there and of course there had to be activities in the educational field, extension; there had to be activities of the farmers themselves. I do not believe you could separate those

very well. The research was the key to it. But in terms of putting those increases in terms of money, that could be done, and it would show what the total benefit had been.

Mr. HORAN. Could that be done?

Dr. SHAW. I would think so, sir.

Dr. MICK. I do have some information that might be of interest to you and that is that the total sales of agricultural products jumped from $1,334,000 in 1949 to $2,764,000 in 1952. Those are products entering commercial channels. There is a twofold increase there in 2 years.

POPULATION BREAKDOWN

Mr. HUNTER. What part of the railbelt population works in defense activities or is actually in the military service?

Dr. MICK. That is a very difficult question to answer. Of course, we have no figures at all on the actual military population. That is, those people who are soldiers. That does include their dependents who live in Alaska, however, and it includes all the people engaged in the service trades, in the building industry. Since Alaska at the present time is supported primarily by construction economy that has emerged out of this defense planning we have to attribute most of it at the present time to the military-construction program. But as to separating that——

Mr. HUNTER. I was wondering whether you could divide your permanent residents and nonpermanent or temporary residents.

Dr. MICK. Yes, sir. That table there includes only the permanent residents. The Alaska Development Board estimates that in addition we have 20,000 transient people, laborers, in the railbelt area during the construction season. That is the 5 summer months. So in addition to that we have 20,000 additional mouths to feed during the summer months. This includes only permanent residents.

Mr. HUNTER. Of those who come there to stay, where do most of them originate, at least during the 4 or 5 years you have been there? I am trying to find out from what part of the United States are they principally coming from?

Dr. MICK. That is very difficult to tell. Most of them come from the United States. There are very few foreign people who are emigrating to Alaska at the present time. And I would suspect that most of them come from the Northwest and the northern tier of States. We have few Southerners who come up there except those who are skilled in some particular technical job like welding or telephonic communications and who come up there to exploit their particular skill.

Mr. HUNTER. You spoke of the influx of seasonal laborers for agricultural purposes. Where do they come from?

Dr. MICK. Do not misunderstand me. The only people we have for seasonal agricultural laborers are the high-school boys and some few women and the disappointed ones out of this 20,000 influx who cannot get work for a contractor.

COST OF CLEARING LAND

Mr. LAIRD. I have one question. What does it cost to clear an acre of this land?

Dr. MICK. The cost varies, sir. If we are in burned-over brush country it can be cleared and the first crop can be put in for about

$75 to $80 an acre. If we are in virgin country that has trees that vary from 4 to 18 inches in diameter, then the cost is considerably more than it is in the first case. It may approach $200 an acre to shear off the timber, break it, fertilize it and plant the first crop.

RESEARCH ON EXPERIMENTAL CABINS

Mr. HORAN. In the last year's report we stated it is the opinion of the committee that the use of these funds should be limited to research on the most essential foodstuffs produced in the Territory. On August 13, 1952, Mr. Whitten, then chairman of this subcommittee, received a letter indicating the need for the use of a small portion of the appropriation for a cooperative program involving research on experimental cabins. I think Mr. Marshall of this committee would like to discuss that with you.

Mr. MARSHALL. Yes, I would, Mr. Chairman. I would like to know what progress you have made along the line of developing these cabins in Alaska out of the material that they have at hand.

Dr. MICK. The philosophy behind the building of those cabins was to investigate both the native materials available there and to investigate the efficiency of vapor-sealing techniques and the efficiency of insulation. Those cabins were not designed primarily to promote human dwellings in Alaska but to develop techniques for building food-storage facilities. This program has demonstrated that vapor sealing is absolutely essential under our environment not only to protect the insulation but to prevent shrinkage of stored vegetables. It has produced very good and very essential results, we think. It is something that will be put to use immediately in our marketing program.

Mr. MARSHALL. Are you continuing that experimental work in this budget?

Dr. MICK. Yes, sir; we have a series of 13 cabins that were built. We have 3 years of data. We need approximately 3 years more in order to eliminate the seasonal variation in the response to these techniques. Of course, the actual building of those structures was a nonrecurring item. All we have now is routine collection of records and that is rather a minimum expenditure.

Mr. MARSHALL. About how much, approximately, will you spend of this budget in carrying on that experiment?

Dr. MICK. Approximately, sir, there will be a third of one technician's time, that is $2,000, and there will be one-half of a clerk's time, which will be $1,700. I would estimate $3,700 to continue the recording and the analysis of that data during the next year.

Mr. MARSHALL. That would be some less than you have been spending?

Dr. MICK. Sir, I do not follow that particular question. That is approximately the level at which that particular project was carried out last year.

Mr. MARSHALL. I presume that is so; the funds here were used for other purposes in connection with other engineering work.

Dr. MICK. That is true. We have an agricultural engineering department. This cabin experiment, so-called, is only a part of their total work. It is one "line project." Most of their work this past year has been on the ventilation of poultry structures, something on which we need information very badly.

Mr. MARSHALL. I think that is all.

MATERIALS COST DIFFERENTIAL BETWEEN UNITED STATES AND ALASKA

Mr. HORAN. How do you react to the old principle of "Pittsburgh-plus" up in Alaska, based upon the fact that the price of steel is always Pittsburgh plus transportation? What is the status up in Alaska; how are you overcoming some of the handicaps you have because of your distance from available critical materials?

Dr. MICK. Of course, sir, the people in Alaska accept as a principle that they should receive for their products the Seattle price plus the cost of freight. We think it is unsound. For example, $10.50 milk does not represent efficient production and that Alaska farmer cannot expect to have a stable industry based on that kind of price structure. We think that he will be able to compete with any producing area in the United States with research to point the way to more efficient production.

Mr. HORAN. What is your problem with other critical materials? Steel is almost out of sight, is it not?

Dr. MICK. Yes, sir; it is. It is very high and it is very difficult to schedule the arrival of those materials in the Territory. In addition to the high pricing, that does have some effect on the use of steel. Of course, most of the steel that is being used in construction in Alaska is in defense projects and they have comparatively little difficulty. It is the small-business man who runs up against the difficulties.

There is, however, some steel arriving in the Territory for private business. There are now two so-called skyscrapers in Fairbanks, one a 12-story and one a 14-story building. There are three such buildings in Anchorage so that it looks as though a rather permanent economy has developed and people there, of course, do have a great deal of faith in the Territory or they would never make that capital investment.

AUTOMOBILES

Mr. HORAN. Dr. Shaw, we have some requests here for three new automobiles. Will you put a justification into the record for the automobiles?

Thank you, gentlemen. That will conclude this hearing.

(The material requested follows:)

NEED FOR NEW AUTOMOBILES

The estimates include replacement of three passenger motor vehicles during the fiscal year 1954. The replacements will be made in Alaska, Puerto Rico, and the Virgin Islands. In each instance, vehicles are used by the director and staff of the Territorial stations in the conduct of research activities.

In Puerto Rico, experience has shown clearly that two passenger motor vehicles are necessary to carry out the station's activities since experimental work is conducted at various locations throughout the island. In the Virgin Islands, one of the two vehicles will be used almost exclusively by the extension personnel who will be traveling throughout the island of St. Croix almost continuously to visit farm and rural families. The other vehicle will be used by the head of the research staff.

The three vehicles to be replaced are located in areas where climate is exceedingly hard on automotive equipment and where roads are in many cases very poor. Proximity to the sea in the Virgin Islands and Puerto Rico also causes a certain amount of salt damage which cannot be avoided. In Alaska not only primitive roads but also extreme low temperatures during much of the year cause very rapid deterioration of automotive equipment. Likewise, repair facilities comparable to those in the continental United States are not available in any of the locations. For these reasons, and for reasons of safety, it is necessary to turn cars in when they have reached the age and mileage of those which are to be replaced in 1954.

The car to be replaced in Puerto Rico was purchased during the fiscal year 1948, and will have traveled approximately 65,000 miles by July 1953. The passenger vehicle in Alaska was purchased in the fiscal year 1948. While this car does not meet the mileage standard for replacement, it has been used under extreme climatic conditions and does meet the age requirement for replacement. The car in the Virgin Islands is a 1941 model which will have traveled in excess of 70,000 miles by July 1953.

The Office has a total of 5 passenger motor vehicles: 2 in the Virgin Islands, 2 in Puerto Rico, and 1 in Alaska.

Passenger motor vehicles at each location are used on a pool basis. A car may not be used without first securing authority from the officer in charge. To the maximum extent possible, several employees travel together when using vehicles.

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS

WITNESSES

DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, ARA
C. F. SPEH, ASSISTANT CHIEF, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
DR. K. S. QUISENBERRY, ASSISTANT CHIEF, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
FREDERICK D. BATES, JR., CHIEF, CHEMICALS AND RUBBER DIVISION, OFFICE OF MATERIALS, MUNITIONS BOARD
E. L. STRUTTMANN, BUDGETARY AND FISCAL OFFICER, ARA
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$578,800	$600,000	$443,000
Reimbursements from non-Federal sources	586	500	
Reimbursements from other accounts	3,212	2,800	2,800
Total available for obligation	582,598	603,300	445,800
Unobligated balance, estimated savings	−28,110		
Obligations incurred	554,488	603,300	445,800

NOTE.—Reimbursements from non-Federal sources above are from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Research on domestic production of natural rubber	$222,320	$225,300	$108,000
2. Investigations of domestic production of vegetable tannins	80,828	107,500	107,500
3. Investigations on vegetable fats and oils	182,005	179,000	116,000
4. Investigations on fiber plants	65,537	88,200	111,500
5. Obligations under reimbursements from non-Federal sources	586	500	
Total direct obligations	551,276	600,500	443,000
Obligations Payable Out of Reimbursements From Other Accounts			
1. Research on domestic production of natural rubber	2,563	2,800	2,800
3. Investigations on vegetable fats and oils	449		
4. Investigations on fiber plants	200		
Total obligations payable out of reimbursements from other accounts	3,212	2,800	2,800
Obligations incurred	554,488	603,300	445,800

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	85	89	70
Full-time equivalent of all other positions	10	16	13
Average number of all employees	84	101	78
Average salaries and grades:			
General schedule grades:			
Average salary	$4,901	$4,787	$4,382
Average grade	GS–7.2	GS–7.1	GS–6.4
Crafts, protective, and custodial grades:			
Average salary	$3,024	$2,871	$2,700
Average grade	CPC–4.2	CPC–3.8	CPC–3.0
Ungraded positions: Average salary	$4,001	$3,530	$3,530
Personal service obligations:			
Permanent positions	$351,137	$390,296	$273,890
Part-time and temporary positions	32,509	49,852	38,300
Regular pay in excess of 52-week base	1,224	1,452	910
Total personal service obligations	384,870	441,600	313,100
Direct Obligations			
01 Personal services	383,646	440,000	311,500
02 Travel	16,486	19,000	17,500
03 Transportation of things	4,739	2,400	1,800
04 Communication services	2,275	3,200	1,800
05 Rents and utility services	13,451	18,400	13,700
06 Printing and reproduction	57	300	100
07 Other contractural services	28,082	33,600	27,200
Services performed by other agencies	11,711	12,700	11,400
08 Supplies and materials	41,071	44,700	35,700
09 Equipment	49,721	26,600	22,600
13 Refunds, awards, and indemnities:			
Awards for employee suggestions	10		
15 Taxes and assessments	899	1,300	1,400
Subtotal	552,148	602,200	444,700
Deduct charges for quarters and subsistence	872	1,700	1,700
Total direct obligations	551,276	600,500	443,000
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	1,224	1,600	1,600
03 Transportation of things	131	100	100
05 Rents and utility services	412	100	100
07 Other contractual services	1,030		
08 Supplies and materials	415	1,000	1,000
Total obligations payable out of reimbursements from other accounts	3,212	2,800	2,800
Obligations incurred	554,488	603,300	445,800

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$92,509	$133,440	$100,040
Obligations incurred during the year	554,488	603,300	445,800
	646,997	736,740	545,840
Deduct:			
Reimbursable obligations	3,798	3,300	2,800
Unliquidated obligations, end of year	133,440	100,040	80,040
Adjustment in obligations of prior years	7,444		
Total expenditures	502,315	633,400	463,000
Expenditures are distributed as follows:			
Out of current authorizations	451,389	540,000	402,000
Out of prior authorizations	50,926	93,400	61,000

Mr. HORAN. Gentlemen, we have before us the request for appropriation based upon the Stockpiling Act of 1946. This authorizes and directs the Department of Agriculture to make scientific, technological, and economic investigations of the feasibility of developing domestic sources of supplies of any agricultural material, or substitutes for such materials, determined by the Munitions Board to be strategic and critical.

At this point we will insert in the record pages 559, 560, and 564 through 567 of the justifications.

(The pages referred to are as follows:)

RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS

PURPOSE STATEMENT

The Strategic and Critical Materials Stockpiling Act of July 23, 1946, in section 7 (b), authorizes and directs the Department of Agriculture to make scientific, technologic, and economic investigations of the feasibility of developing domestic sources of supplies of any agricultural material or substitutes for such materials determined by the Munitions Board to be strategic and critical. This appropriation is for the purpose of enabling the Department to carry out its responsibilities under that act.

This program is administered by the Agricultural Research Administrator. The Munitions Board, however, recommends or approves investigations to be undertaken. Funds are allotted to those research agencies of the Department which are best equipped to carry out the investigations required.

Investigations are at present being conducted on rubber, tannin, vegetable fats and oils, and materials for cordage.

	Appropriated, 1953	Budget estimate, 1954
Appropriated funds	$600,000	$443,000

Research on strategic and critical agricultural materials

Appropriation act, 1953, and base for 1954	$600,000
Budget estimate, 1954	443,000
Decrease	−157,000

Summary of increases and decreases, 1954

Decrease due to elimination of processing research in connection with the domestic production of natural rubber	−$117,300
Decrease due to elimination of work on substitutes for strategic end uses of castor oil	−63,000
To intensify production research on fiber plants, particularly on kenaf as a substitute for jute	+23,300

Project statement

Project	1952	1953 (estimated)	Increase or decrease	1954 (estimated)
1. Research on domestic production of natural rubber	$222,320	$225,300	−$117,300	$108,000
2. Investigations of domestic production of vegetable tannins	80,828	107,500	.....	107,500
3. Investigations on vegetable fats and oils	182,005	179,000	−63,000	116,000
4. Investigations on fiber plants	65,537	88,200	+23,300	111,500
Unobligated balance	28,110	.....	.....	.....
Total appropriation or estimate	578,800	600,000	−157,000	443,000

STATUS OF PROGRAM

This appropriation enables the Department of Agriculture to carry out its responsibilities under the Strategic and Critical Materials Stockpiling Act of July 23, 1946. This act authorizes and directs the Department to make scientific, technologic, and economic investigations of the feasibility of developing domestic sources of supplies of any agricultural material or substitutes for such materials determined by the Munitions Board to be strategic and critical. Investigations are undertaken only upon recommendation of the Munitions Board.

Current activities include research on domestic rubber production, tannin, strategic oils, and fiber plants, as follows:

1. Rubber production investigations are carried on in California and Texas to develop new strains of guayule by hybridization, selection, and testing which will increase the yield of natural rubber; and to test means of quickly and inexpensively establishing field stands of guayule. At the United States Natural Rubber Research Station at Salinas, Calif., investigations are carried on to develop better methods for the extraction of rubber from the guayule plant; to develop a continuous process for deresination of the crude rubber, and to produce deresinated rubber in sufficient volume for industrial evaluation. The extraction and processing phases of this research will be discontinued before the end of fiscal year 1953.

2. Tannin investigations are at present devoted to the possible production of tanning materials from crops that can be produced in the United States, with special reference to canaigre, a desert crop grown in the southwestern United States. Experimental plantings have been established in Arizona, New Mexico, and Texas. Production problems encountered in growing this crop on a semicommercial scale are being studied. A pilot plant has been designed and installed for preparation of the canaigre tanning extract on a scale large enough to permit commercial evaluation by its use in the production of experimental lots of heavy leather.

3. Current work on strategic oils is devoted to problems encountered in the expansion of castor-bean production into new areas to meet the increased demands for castor oil; to the development of superior varieties adapted to growing and mechanical handling in new areas of production; and to the development from domestic oils of substitutes for those strategic uses which now require castor oil. The latter phase of the work will be discontinued by the end of fiscal year 1953.

4. Studies in the field of strategic cordage are directed toward problems encountered in developing the domestic production of hard fibers and hard-fiber substitutes (sansevieria, phormium, and hemp) that can be used for such purposes as lines and ropes on naval vessels, and of kenaf, a soft fiber with qualities similar to jute.

SELECTED EXAMPLES OF RECENT PROGRESS

1. *Research on domestic rubber production.*—During the year 3,225 new controlled crosses or backcrosses were produced in the breeding program. A new testing routine has been developed under which month-old seedlings are transplanted to flats in greenhouses and analyzed for rubber yield 4 to 6 months later, about 1 year earlier than would have been possible if they had been transplanted to the field. Over 10,000 seedlings have been tested during the past year and about 3 percent selected for field trials.

New hybrids, developed by crossing with *Parthenium stramonium*, a much larger plant than the standard guayule variety 593, have been found to have almost equal rubber percentage and considerably larger plant size. Thus the new strains have potential yields from 50 to 100 percent higher than those of the best strains of guayule. The quality of the rubber from these larger hybrids is comparable to that from guayule.

Charcoal rot caused considerable loss of plants in Texas, both in nurseries and in dry-land plantings. The development of resistant varieties seems to be the best protection. Some of the newer high-yielding hybrid strains appear to have resistance to charcoal rot, but need to be more thoroughly tested in field trials in Texas.

2. *High quality of guayule rubber demonstrated in truck-tire tests.*—Use of natural rubber is essential for carcass construction in large-size trahsport tires because no synthetic rubber has met this critical need. In order to determine the usefulness of deresinated guayule rubber for this purpose test lots, totaling approximately 4,000 pounds, were submitted to tire manufacturers for fabrication of tires, particularly heavy-duty truck tires. Road tests were conducted by the

Office of Rubber Reserve. The first set of truck tires, on which tests have been completed, demonstrated that deresinated guayule was equal to hevea (plantation) rubber with respect to all important service characteristics, including average miles to failure, heat build-up, and crack growth.

3. *Progress in the development of a con'inuous deresination process.*—Removal of the 20 percent or more of resinous material in crude guayule rubber is an essential step in the production of high-quality rubber such as required for critical use in tires. Deresination is presently accomplished by a batch method of acetone extraction of the resinous rubber as obtained directly from the pebble-milling process. After investigating the possibilities of various types of continuous-extraction equipment, development work was undertaken on a moving belt-conveyor type as being the most promising for process development. A small single-batch-type unit built to test the idea has performed satisfactorily.

4. *Development of domes'ic tannin crops.*—Canaigre continues to show the greatest promise as a domestic source of tanning material. The 55 experimental acres of canaigre now under cultivation in the Southwest provide plantings to develop agronomic information for production practices and harvested roots for pilot-plant tests of tannin extraction. They include 30 acres of 2-year-old plants which will be harvested in the early summer of 1953 and 25 acres that will be harvested in 1954. Substantial improvements in cultural practices have been developed and improved strains with higher tannin yields are being produced and tested. Approximately 62 tons of dried roots which have been produced from experimental plantings are now available for pilot-plant tests of tannin extraction. Twenty-eight hundred pounds of seed collected from experimental plantings are being held in storage for planting stock in case of emergency.

5. *Development of a domestic source of castor oil.*—To support the expanding castor-bean-production program, new castor-bean varieties have been developed by the breeding program which are better suited to specific areas of production and cropping practices. Resistance to shattering of seed and dropping of capsules were emphasized in the breeding work. In tests near Stillwater, Okla., USDA 74 was the highest yielding variety, producing 909 pounds per acre as compared with 651 pounds for Cimarron, an intermediate yielding variety. Under some conditions and cropping practices, however, USDA 74 requires two harvests to prevent loss of capsules. An extensive variety testing program in some 30 locations in Oklahoma, Texas, California, Nebraska, Illinois, Missouri, Arkansas, and Tennessee is being conducted to select varieties best suited to different producing areas and cropping practices.

A castor-bean stripper has been developed for the 1952 harvest which weighs about 1,000 pounds less than the 1951 model, is more maneuverable, and incorporates a number of other changes which improve its performance.

6. *Synthetic lubricants derived from soybean oil residues (foots).*—Lubrication of jet engines requires oils that will still flow at temperatures below −65° F., yet retain their lubricating properties at temperatures as high as 392° F. At present, the base for these lubricants is a compound of sebacic acid, derived from castor oil which is being stockpiled for emergency use. Results to date indicate that slight modification of compounds derived from fatty acids of soybean and other vegetable oil foots will give materials with suitable viscosity characteristics and pour points comparable to those of the sebacic acid compound.

7. *Azelaic acid derived from furfural.*—Research workers in the Departments of the Navy and the Air Force have found that esters of sebacic and azelaic acids have especially good properties for lubricants which will function efficiently at both very high and very low temperatures. These acids are now derived from castor oil or other oils which might be unavailable or critically short in time of war. A laboratory procedure has been developed for the synthesis of azelaic acid from furfural (derived from corncobs) and acetaldehyde (derived from ethyl alcohol). This procedure is being investigated intensively to determine the best operating conditions for obtaining highest yield at lowest possible cost.

8. *Research on domestic production of strategic fibers.*—*Sansevieria* is the best known substitute for abacá in ropemaking. Considerable progress has been made during the past year in developing weed-control methods for *sansevieria* production. A new chemical weed killer gives promise of great effectiveness.

A serious disease of *kenaf* occurred in widespread areas of Cuba and Florida in 1951. Disease resistance has been found in some strains and tests are being conducted to evaluate these varieties for commercial production. Engineering studies are in progress to reduce the costs of production. Work is being conducted on a machine to combine harvesting the kenaf and preliminary processing whereby most of the nonfiber plant material would be left in the field.

30505—53—pt. 2——15

Agronomic tests with *hemp* in Kentucky and Missouri indicate that it can be grown successfully in that area on well drained soils of medium fertility. Fiber obtained from these plantings appears to be of good quality. In the breeding program, emphasis is being placed on the development of improved strains with low marijuana content to avoid producing a crop which must be controlled under very strict limitations by the Bureau of Narcotics.

Mr. HORAN. Dr. Clarkson, we would appreciate having your general statement now.

GENERAL STATEMENT

Dr. CLARKSON. I have a prepared statement that I would like to read if that is agreeable to you.

Mr. HORAN. That will be satisfactory.

Dr. CLARKSON. As you said, research on strategic and critical agricultural materials is carried on by the Department under authority of section 7 (b) of the Strategic and Critical Materials Stockpiling Act of 1946. Since the inception of this work in fiscal year 1947, the Department has followed the practice of conducting only research requested by the Munitions Board. The budget estimates for 1954 carry a net decrease of $157,000 as compared with the current appropriation. There are four general lines of work.

Our total for this year is $600,000. We have for the 1954 budget a decrease of $117,300 in rubber work. That is to eliminate the processing work on rubber. A decrease of $63,000 to eliminate the processing work on oils and an increase of $23,300 to increase our work on fibers. That, taken altogether, is a net decrease of $157,000, leaving $443,000 as the total amount of the budget request for 1954.

Mr. HORAN. That includes all transfers and all allocations from other departments for your work?

Dr. CLARKSON. That is so.

RESEARCH ON DOMESTIC PRODUCTION OF NATURAL RUBBER

The estimate provides for a reduction of $117,300 under this project as a result of the planned discontinuance of the processing research at the end of fiscal year 1953. The remaining $108,000 for this work would permit continuance of the production research at its present level through fiscal year 1954, after which it is planned to discontinue such research also and place the improved lines developed by the research program in standby plantings with a nominal expenditure to insure their care and preservation.

Since the discontinuance of the research on domestic production of natural rubber is impending, I would like to discuss very briefly the present status of that work. Breeding to develop more vigorous and higher rubber-yielding strains of guayule suited to dry-land areas of the Southwest is carried on in California. Tests of some of the earlier strains have been made in southwest Texas, where severe and prolonged drought during the past 2 years has afforded an excellent opportunity to select for resistance to charcoal rot and other diseases accentuated by drought conditions. Disease-resistant selections found to transmit higher rubber content have been used in backcrossing with the hybrid lines to give both resistance to charcoal rot and increased yield of rubber.

Chief reliance for high yield is being placed on the development of hybrids between guayule and its treelike relative *Parthenium stra-*

monium. The outstanding vigor of the stramonium parent is retained in successive backcrosses to guayule. Greenhouse tests with some of the second backcross progeny indicate that rubber concentration is equal to or surpasses that of the older strain 593, or even 65–X, the last of the improved strains of straight guayule. Two of the new hybrid strains have been planted in increase blocks for seed production.

Since any future program of rubber production from guayule probably would be in the dry-land areas of Texas, where competition with food, fiber, and other strategic crops would be at a minimum, the breeding program, which can be conducted best in California is geared to the Texas field testing. All selections that survive rigid greenhouse tests are planted in Texas for field comparisons.

The objective of the processing studies has been to develop a commercially acceptable method for the production of a natural rubber which could replace imported hevea rubber, insofar as its physical and chemical properties would be concerned. It was soon recognized that a better yield and a higher quality rubber could be obtained from lush, freshly harvested, shrub. Shrub in this condition was subjected to various types of pulverizing and macerating processes, using mills and combinations of mills of various types and designs. Methods and equipment to remove the corky and fibrous materials were studied, resulting in a device to waterlog these unwanted materials, thereby effecting a very satisfactory separation of them from the guayule rubber worms.

The laboratory now has a continuous semipilot plant in which the pulverized shrub is fed to the mills and the resinous guayule worms emerge to be dried.

Guayule rubber in this form, still containing too much insolubles, such as fibers, and about 20 percent of resins, still does not have characteristics of hevea rubber. To obtain an acceptable rubber, it is necessary to still further reduce the insolubles and to remove the resins. Considerable laboratory work was done, using a wide range of solvents and various types of equipment. There has now been developed a method using acetone as a solvent which yields an acceptable product.

Deresinated guayule rubber produced by this method has been evaluated for a wide range of uses. Passenger car and heavy-duty truck tires, the carcasses of which were made of deresinated guayule by various tire manufacturers, were tested by the test fleet of the Office of Rubber Reserve. The results showed the deresinated guayule rubber to be fully equal to hevea.

The Wright Air Development Center, Patterson Air Force Base, Dayton, Ohio, has negotiated a contract for the production of airplane tires of the improved guayule rubber which will be tested for substitution for hevea should an emergency require it. Tests are being made with the guayule rubber for use in inner tubes.

Plans for developing methods of storage of shrub to maintain it in lush condition will be dropped as well as work on translating the laboratory continuous deresination method into a potential commercial process. No work has been done on determining the composition of the extracted resins with a view to finding uses for these resins to serve as a credit on the cost of processing.

Although substantial progress has been made in this research to bring us nearer to a feasible domestic supply of rubber, there are many unsolved problems still remaining. In winding up this work we will

complete our records and place a full report in the hands of the Munitions Board for whatever future use may be required.

That report will include information on the failures as well as the successes so that whoever follows in the work at some future date will not have to follow the same blind alleys that we have had to explore.

Mr. HORAN. You have abandoned the hope of any rubber from dandelions?

Dr. CLARKSON. That does not seem to be within the range of practicability.

Mr. HORAN. That seemed to be the conclusion we had when Mr. Whitten and I were at the Salinas, Calif., laboratory. Now, you are concentrating on this guayule and this new tree? Do you intend to maintain those plots at Salinas?

Dr. CLARKSON. The plan is that we will continue our selection work during the coming year and during that time place the improved varieties in position that they can be held.

GUAYULE SEED IN STORAGE

Mr. HORAN. What have you done with the seed that you had in storage there?

Dr. CLARKSON. We have around 26,000 pounds of seed in storage, some of it in California, the rest in Cheyenne, Wyo.

Mr. HORAN. Is it still fertile?

Dr. CLARKSON. Yes. The old seed tests about 30 percent germination and the new seed about 70 percent.

Mr. HORAN. Can't we do something about that seed? We cannot hang on to it forever.

Dr. CLARKSON. It is stored now under the best conditions we know how to store it.

Mr. HORAN. Is that under the direction of the Munitions Board?

Dr. CLARKSON. Yes, sir.

Mr. HORAN. They want it stored rather than planted in proper places in Texas and in the foothills of California?

Dr. CLARKSON. This is all strain 593. Our experience on plantings in Texas with the charcoal rot during times of drought such as we have has in these past 2 years would indicate that it would not be wise to put this strain into plantings there because we may run into another period of that kind which would tend to destroy a great deal of it.

Mr. HORAN. The conclusion is that it is better to store it under the best possible conditions; is that right?

Dr. CLARKSON. Yes, sir.

Mr. HORAN. Are there any other questions on this rubber project before we leave it?

COMPARISON OF GUAYULE RUBBER WITH SYNTHETIC

Mr. HUNTER. In what respects is the guayule rubber superior to synthetic rubber?

Dr. CLARKSON. They are different types of rubber entirely. I would like to have Mr. Speh respond to that.

Mr. SPEH. Synthetic rubber is being continually improved in quality. Each improvement undoubtedly does permit its wider use

to replace hevea. To date there are certain uses to which they still hesitate to use synthetic rubber and the results would indicate that the synthetic rubber will not replace hevea, for instance, in heavy-duty truck tires. They rather hesitate to use it in airplane tires and there probably are some other uses. For that reason, there is a feeling and I think Mr. Bates could give better information on that, that there is a need of a substantial supply of the natural rubber on hand.

The rubber hydrocarbon of guayule rubber is essentially the same as the rubber hydrocarbon of hevea rubber. However, there are still some differences due to the fact that we have not yet been able to completely remove all of the resins or all of the insolubles.

However, even with the deresinated rubber that we are producing or have produced to date, the heavy-duty truck-tire tests indicate that it is equal to hevea, but the Office of Rubber Reserve report states that it is superior to hevea. For the other uses under test we do not know the results. That is, for airplane tires and airplane-tire inner tubes. So, summing it up, I would say that even as well made and as improved as is synthetic rubber, still, synthetic rubber lacks certain requirements for certain essential uses.

Mr. HUNTER. Then you would say that guayule rubber with resin is superior to synthetic rubber for use in heavy-duty truck tires?

Mr. BATES. I want to substantiate what Mr. Speh said. It is perfectly true that to date there has not been a synthetic rubber made which can perform satisfactorily by itself in heavy-duty truck tires and in airplane tires. The heat is always generated excessively in those large tires so that the cords give way. That is one of the principal reasons for our stockpiling of natural rubber, that large requirement that we have for heavy-duty truck tires and airplane tires. As Mr. Speh said, the rubber from the guayule plant is essentially a natural rubber and when you remove the resins it is virtually the same material as the rubber from the hevea tree. So by that token it is superior to synthetic rubber for use in heavy-duty tires.

Mr. HUNTER. What percentage of natural rubber is required in a heavy-duty truck tire in order to make it serviceable?

Mr. BATES. It depends on the size of the tire. You might say that in the case of the average heavy-duty truck tire, such as you might see on a Capital Transit bus, which would be a 9.00–20 tire, the best we have been able to do, or the best that the research people in the Office of Rubber Reserve have been able to do in their experiments to try and replace all of the natural rubber is to use about 67 percent synthetic. In other words, 33 percent has to be natural. As your tire gets bigger, your percent of synthetic decreases and your percent of natural has to increase. And in a large tire, a very-heavy-duty tire, such as, say, 14.00 diameter, as opposed to the 9.00 I spoke of, the percentage of natural rubber gets very close to 100. In all airplane tires, natural rubber is required by the military departments. That is particularly true today where landing speeds are higher and higher all the time.

Mr. HUNTER. Do you see any prospect of an economically feasible process by which the resins can be removed from guayule rubber?

PROCESSING OF GUAYULE RUBBER

Mr. SPEH. The crude guayule rubber contains about 20 percent resins. We have developed a laboratory method which we use on a larger than laboratory scale by which we are reducing the 20 percent to 2 percent and we can reduce it still further but we so far have not developed a practical process which will reduce it because, frankly, we have been so busy in trying to provide a sufficient supply for the evaluation tests that we haven't spent as much time on perfecting a method as we probably should. We did not want to go ahead with any of our work until we were assured that we could produce a rubber which would be acceptable.

The same thing holds for the reduction of the insolubles present. We have reduced them from 10 to 5 percent. It would be highly desirable if that could be brought down under 1 percent. I sincerely believe if we can reduce the insolubles down below 1 percent and the resins to about I would say half a percent, we would have a rubber which would meet all the requirements which a natural rubber would have, excepting possibly latex as we are not doing any work on the production of latex from guayule rubber.

POSSIBILITY OF PLANTING SEED NOW IN STORAGE

Mr. WHITTEN. For some 5, 6, 7, 8 years, you have had those seedlings. And the Federal Government has a lot of land. It takes seed a number of years to become plants and you can't get the rubber out unless you have the plant. I still can't see why those seed are not put in the ground somewhere as against being stored in storehouses. We tried to interest the military in planting these seed. We wanted them to use some of the military land for these seed. Then we tried to interest the forestry people in it. What is the latest on why these seed are merely held in storage as against being in the ground and growing into plants? Has anybody taken the initiative in pushing that on through and making them say "No," so it is their responsibility if they don't put it in the ground?

Dr. CLARKSON. There have been no further considerations of that during this year, but based on the investigations that were made a couple of years ago, it was the conclusion of all who were concerned with it in the two departments that the hazards of putting it in the ground seemed to outweigh the hazards of leaving it in storage. We have run into one of those hazards now in Texas with this charcoal rot. We didn't believe as short a time as 2 years ago that it would affect the plantings in dryland areas of Texas, as it has during this drought.

Mr. WHITTEN. How long after you put the seed in the ground before you could hope to have any real quantity of rubber from it?

Dr. CLARKSON. To get full yield from it we figure about 5 years from first planting. There has been some work undertaken to partially harvest it in 2 years to see if the new growth can be reharvested economically, but that work has not progressed far enough to know much about it.

Mr. ANDERSEN. Along that same line, how much do these seeds in storage decrease in fertility each year?

Dr. CLARKSON. Eight thousand pounds, what we call the old seed produced in 1943, is regarded as having a 30-percent germination rate. The new seed that was produced last year and the year before tests 75 percent. It was reduced that much in 10 years.

Mr. ANDERSEN. This 1943 seed today has a fertility rate of only 30 percent. At what point along the line of decrease in fertility do you consider it worthless? If it goes down to 25 or 20 percent, is it worth holding for the future?

Dr. CLARKSON. We would think it is worth holding. It is a matter of adjusting the seeding rate accordingly.

Mr. HORAN. Along that line, do you have any program for surveillance tests on the fertility of the seed and a planting program?

Dr. CLARKSON. We have each year a testing of the germination rate to see that our seed is holding up, but we have no plan presently to use any of this stockpile of 28,000 pounds.

Mr. HORAN. We are very much interested in this, Dr. Clarkson, and this subcommittee, I know, would like to get that seed in the ground even with the danger of rots and other menaces, rather than have you take it out of our storage granary and dump it over the hill because it is worthless. We feel that there is available land where it can be planted, public lands. We have got lots of them in southern California and even in Texas where at least you could spread the seed out on the ground even though there is an outside danger that it might not grow.

Dr. CLARKSON. We would think from our experience of the last 2 years that certainly in Texas we would stand a good chance of losing our investment by seeding it.

Mr. HORAN. I am not talking too much about public investment. We have got public lands where very, very inexpensive experiments could be conducted with this guayule because it is indigenous to that area anyhow. Mr. Andersen, Mr. Whitten, and I were somewhat disappointed when we visited the Salinas laboratories. We asked a lot of questions that were not answered. It troubled us tremendously.

Mr. WHITTEN. I recall, Mr. Horan, that they pointed out that if somebody would furnish them this $500 to $1,000 an acre land and supply the irrigation free, that they could then make it a competitive commercial crop.

Mr. HORAN. Our reaction to that was not good. We would like to see this seed put out where it first started, that is on pretty arid land, on land that doesn't cost the Government anything. The only cost we would have would be running a disc over it and planting the seed in the proper way. That is the reaction we have. Apparently somebody in the organization, Dr. Clarkson, feels that they have to rent land at a high price and they have to dig a well and they have to install pipes and pumping machinery and they have to go to a lot of expense. That is all right for experimental plots but for going into practical production of guayule or anything else and knowing your economic limits you just can't do that.

Dr. CLARKSON. It was recognized that varieties had to be developed which could be produced without having to be grown in the expensive irrigated areas of California. While we are hopeful that this backcross with stramonium furnishes such plants, it also has to be disease

resistant. We certainly can't plant it in the dry-land area of Texas unless it is disease resistant, and the hazards in other dry-land areas are in the realm of the unknown to a certain extent.

Mr. HORAN. We are not arguing. We want only to point out that we would rather see it rot in the ground in its proper place than have it rot in the granary.

I had no complaint about what we saw at the experimental mill. I was impressed with the work being done there at Salinas and also the testing laboratory we visited.

POSSIBLE USE OF GUAYULE SHRUB FOR EROSION CONTROL

Mr. MARSHALL. Being almost completely unfamiliar with the plant, would it have any value from a standpoint of erosion control?

Dr. CLARKSON. Dr. Quisenberry will answer that.

Dr. QUISENBERRY. I don't believe so. It is usually grown as a row crop similar to corn. We have the experimental plantings in rows. Usually you have to cultivate it to start with to protect it from weed competition, and, unless you plant it on the contour, I wouldn't think of guayule as an erosion crop. Of course it is primarily a dry land plant.

Mr. MARSHALL. I was thinking in terms of wind erosion and we do in wind erosion plant a number of crops that are cultivated in rows.

Dr. QUISENBERRY. It might have some possibilities there, sir, as a control of wind erosion. I was thinking more in terms of water erosion.

Mr. MARSHALL. My thought was, since you are talking about semi arid land, that it was directed toward wind erosion.

Dr. QUISENBERRY. The shrub grows from 3 to 4 feet in height, and is fairly bushy.

Dr. CLARKSON. Rather slow growing.

Mr. MARSHALL. That is all.

NEW GUAYULE HYBRIDS

Mr. HORAN. How about this tree; that is, the new one? They had some trees there which were pointed out to us when we were there. Has that increased in prospect?

Dr. CLARKSON. Yes, it has.

Dr. QUISENBERRY. Possibly when you were at Salinas they showed you the big shrub back of the greenhouse that grew almost as high as the building. That is the one that has been used in crossing. That is the Stramonium plant or species that has been used in these crosses.

EXCHANGE OF AMERICAN SURPLUSES FOR STRATEGIC MATERIALS

Mr. HORAN. There is one question I would like to have either Dr. Clarkson or Mr. Roberts answer. We are under considerable pressure from the agricultural industry to increase our foreign trade. We are up against hard and soft currency and other factors in that field. Personally, I am very much for it. Of course it has always appealed to me. That perhaps at this point if it were possible to have bartered we would be much better off. We know that Russia has bartered her wheat for long-staple Egyptian cotton and has received a value as high as $3.75 a bushel or even higher than that

and trades have occurred between Argentina and other nations at a very high figure per dollar. In the case of strategic materials which we are protecting or want here with this research, why couldn't we barter some of our native surplusses for a stockpile which we are willingly admitting we need because we are doing research here to protect the 12 or 15 elements that we don't produce at home. I would like to have either you or Mr. Roberts reply to that.

Dr. CLARKSON. I don't have the answer.

Mr. ROBERTS. I don't either.

Mr. HORAN. Does anybody?

Mr. ROBERTS. Mr. Bates may know more about that than I. Under existing legislation which provides authority for stockpiling, there is authority for barter and there have been some transactions completed where the barter of agricultural commodities has been involved. I believe the actual data regarding those transactions is classified material. If this committee wishes to have some facts presented to it, that might be possible. It would probably be inappropriate to have it in the record. Mr. Bates, do you have anything to add to that?

Mr. BATES. Only that in the case of rubber, we have obtained substantial quantities from Great Britain under the ECA route, that is with counterpart funds whereby——

Mr. HORAN. We are trying to get away from that. I think that you, as a taxpayer, know that we are.

We have an investment in most of those counterpart funds ourselves. And on International Wheat Agreement wheat, we know we have 70 cents a bushel in practically every bushel we are supplying. We don't know that we will renew the International Wheat Agreement. We are going to state our case. We have gone down a long ways in our initial approach because we tried to be honest with ourselves. We recognize that we need rubber, we need quinine, 12 or 15 other items that we don't produce at all at home.

Nickel is one of them and the surprising thing is that the countries that are low in wheat products, or low in starch products, are also high in the production of these things we need. Well, why in the name of heaven can't we strike a bargain rather than to go through other countries more adept at trading? Why can't we deal directly with these folks if we can't renew the international agreements? It is the weakness of our bargaining system. We are just hamstrung in these international wheat agreement meetings. We don't know scat compared to England and other nations in international dealing, and yet here we need these things. We are appropriating $600,000. It is not a big amount. I am for it, and I think you understand what I mean. But we have to go to England or have to go to somebody else to make a deal. It is stupid, the things we do. I think you know that, Mr. Bates. You have been close to this. I am not being critical, it is just the way I feel.

Will you please reply to my question as fully and as judiciously as you can. Certainly the press has been filled with everything we have discussed here.

Mr. BATES. I think Mr. Roberts might be the better one on the actual barter problem.

Mr. HORAN. You decide that among yourselves, and if you decide more time is needed be prepared to discuss this matter on the record

insofar as its classification will permit when OFAR appears before the committee. At that time we want to consider the whole question of international trade.

GERMINATION STATUS OF GUAYULE SEED STOCKPILE

Dr. CLARKSON. I would like to make one more comment on the rubber, to say that 18,000 pounds or about three-fourths of our seed supply is fresh seed testing 70 percent germination. The 30 percent germination rate applied to the 10-year-old seed.

Mr. HORAN. Let us get that in the ground if possible. Will you talk to the Munitions Board about that?

Dr. CLARKSON. We will look into it.

Mr. HUNTER. Does the guayule bush deteriorate after 5 years? Is there any age at which it is no longer useful for rubber production purposes?

Dr. CLARKSON. It reaches maximum in rubber content and then tends to become tough and harder and harder to handle in milling and processing.

Mr. HORAN. At what age?

Dr. CLARKSON. After 5 years.

Mr. SPEH. We have extracted rubber from a 12-year-old shrub which is just the same as the other if we remove insolubles.

Mr. HORAN. It is a matter of processing rather than the quality of the rubber.

Mr. BATES. I didn't get the last question before that.

Dr. CLARKSON. The chairman asked us to consider again the matter of putting out the seed on Government land somewhere as a natural living stockpile.

Mr. HORAN. Before it rots.

Dr. CLARKSON. I wondered if you had anything further you wanted to say in regard to that.

Mr. BATES. I think it might be more appropriate for the Department of Agriculture to comment on it but I would say that 2 or 3 years ago we were quite enthusiastic with the idea of seeding this material from airplanes or on semidesert land and getting this living stockpile, but the few experiments that were made along those lines were highly unsuccessful. As I recall the story there was practically no survival.

Mr. HORAN. It was my impression that you could not do it that way. You would have to go out with a tractor and a disc and at least disc it and then spread the seed so you could get it under the ground. That is rather tedious way to do it compared to an airplane, but it could be done. After all, 18,000 pounds of seed isn't too much. It would take some time to do it but you can seed 18,000 pounds of seed in a reasonable time even by that method.

Mr. BATES. It is my impression that as of the moment that is not a proven method of raising guayule shrub because——

Mr. HORAN. The guayule shrub was originated out in the desert.

Mr. BATES. I am not an expert on this but when we had the seedling program, the conventional method was to start from a seedling bed and then transplant.

Mr. HORAN. That is not the way it originated. The guayule is not a new rubber-producing plant, as I understand it. It is at least a quarter of a century old if not older.

Mr. HUNTER. They worked on it in the First World War.

Mr. WHITTEN. It is a native wild plant in Mexico. The reason for the way we have handled it is to try to speed up the production process.

Mr. HORAN. It is up to you gentlemen to plant this seed. We don't want it to rot in that granary.

Dr. CLARKSON. We will reconsider the matter.

Mr. HORAN. I wish you would. I had much rather have it rot in the ground than in a granary. We have to pay storage charges in the warehouse.

INVESTIGATIONS OF DOMESTIC PRODUCTION OF VEGETABLE TANNINS

Dr. CLARKSON. The next item is investigations of domestic production of vegetable tannins.

The estimate for this project for fiscal year 1954 is the same as the amount in the current appropriation—$107,500. More than four-fifths of the vegetable tannin used in this country is imported and our domestic supply, principally from dead chestnut wood, is nearly exhausted.

Mr. HORAN. We had a chestnut blight in the United States that has practically removed the chestnut trees from the entire United States, from which we originally got our tanning bark.

Dr. CLARKSON. We have been using the wood of these dead chestnut trees for quite a number of years and it is estimated that within the next 7 to 10 years, that supply will be exhausted.

Mr. HORAN. Elsewhere in the Department of Agriculture research we are developing a chestnut that is resistant to the blight that is striking our chestnut-tree industry in the United States, and we are watching very closely the results of the attempt to introduce into the United States a blight-resistant chestnut tree.

PROGRESS IN CANAIGRE PRODUCTION

Dr. CLARKSON. The Munitions Board has strongly supported a research program to develop canaigre as a tannin-producing crop.

Experimental plantings of canaigre in the Southwestern States are used as a source of supply of roots for extraction and tanning experiments and also for research on variety and agronomic problems important to the development of canaigre as a commercial farm crop. The latter include: (1) Variety improvements for higher tannin content, improved yield, and suitable plant types for specific areas, improved extractability of tannin, better root location and shape for harvesting; (2) propagation and other cultural studies; (3) development of plant types suitable to mechanical harvesting, and row and spacing arrangement to suit mechanical handling; (4) disease identification and determination of control measures; and (5) root storage through delayed harvest, pit storage, or drying.

The tuberous roots of the canaigre plant when moisture-free contain tannins ranging from 20 to 40 percent, sugars ranging from 7 to 22 percent, and starch ranging from 20 to 40 percent. A satisfactory

laboratory method has been developed to overcome the presence of starch and sugars in the extraction of tannin. A pilot plant has been completed for the study of the laboratory method applied to a semi-commercial scale. This also will produce enough canaigre extract for evaluating leathers processed with it. Large lots of canaigre tannin extract will be used for commercial tanning tests of sole leather to provide the Office of the Quartermaster General with sufficient commercial samples of leather tanned entirely with canaigre tannin for testing and evaluation for military purposes.

Experimental shoes have been made to evaluate canaigre extract and are now under use tests by postmen in the Chestnut Hill, Pa., area. In each pair of shoes one sole was tanned with a canaigre blend and the other sole with a commercial blend. The test is now nearing completion, and the results definitely indicate that canaigre blend tanned sole leather is equal to current commercial tannages.

Investigations on Vegetable Fats and Oils

The next item is investigations on vegetable fats and oils.

CASTOR-OIL PRODUCTION

Castor oil, which has a wide variety of important uses from the standpoint of national defense, is derived almost entirely from imports from foreign countries. For the past 2 years around 100,000 acres of castor beans have been produced in this country under a program carried out by the Production and Marketing Administration of the Department at the request of the Munitions Board. A similar program is planned for this coming crop year. Research activities are being conducted in cooperation with State experiment stations to provide suitable varieties, effective cultural practices, and harvesting equipment for efficient handling of the crop. Current research activities are directed toward: (1) Variety improvement for nonshatter and nondrop capsules, better harvestability, better yield, and suitable plant types for specific areas; (2) cultural studies on planting, cropping practices with other farm activities, fertilization, weed control and irrigation; (3) disease control; (4) harvesting studies; (5) experimental development of inbred lines to produce hybrid seed for commercial planting with greatly increased yields; and (6) development of improved harvesting machinery, with better trash removal, lighter weight, increased maneuverability, and less loss of beans by shattering.

Two years ago at the request of the Munitions Board research was also undertaken to find domestic replacements for sebacic acid which is now derived from castor oil and is used as a lubricant in jet engines. The possibilities of developing products derived from soy-bean oil foots have been investigated. Thirty-eight new derivatives have been prepared and their potential lubricating values studied. Two of these were found by the Naval Research Laboratory to be suitable bases for lubricants at temperatures as low as $-50°$ F. Some of these derivatives appear to be suitable for particular use by the Air Force. Eight additional derivatives are now being prepared which we believe may be of improved usefulness.

Because of the progress already made in this field and the rather favorable outlook in the castor bean production work, the Munitions

Board has requested that the search for substitutes be discontinued. The estimates for fiscal year 1954 therefore include a reduction of $63,000 in this item.

OTHER DEPARTMENTS ENGAGED IN RESEARCH ON STRATEGIC MATERIALS

Mr. HORAN. The Department of Agriculture, it is well known, was conducting these experiments, at the request and with the cooperation of the Munitions Board, because new developments in mechanics have opened up new needs. We all know that jet engines, for instance, call for new metals and new alloys. I would like to have Mr. Bates reply to this question. What other departments are conducting experiments for the Munitions Board? I do not think this is secret information.

Mr. BATES. No, sir. I will reply to the best of my ability. I am not a research man.

The Research and Development Board would be able to give a much more comprehensive answer, I am sure. But military research by and large is carried on either by laboratories owned by the bureaus and departments of Army, and so forth, or by contracting either with industries or with universities. As far as other Government agencies are concerned, it is not too common to farm out research contracts. There are some I know of, some work done by the Bureau of Standards for the Defense Department. I happen to know about one particular arrangement which we made in the rubber program because that is my commodity. The Secretary of Defense requested the Chairman of the Reconstruction Finance Corporation to enlarge his research work on synthetic rubber to include trying to increase the amount of synthetic rubber in heavy-duty truck tires. The Department of Defense does not make any direct appropriation of funds in that program. It is done by RFC at our request.

Mr. HORAN. Are there any additions you might be able to make to this? Dr. Clarkson, you have only one phase of what the Munitions Board needs.

Dr. CLARKSON. I have no answer for your question directly except to point out that the Strategic and Critical Materials Stockpiling Act in section 7 (a) has provision for research by the Secretary of Interior through the Director of the Bureau of Mines and Director of Geological Survey in the same manner that section 7 (b) provides for the Secretary of Agriculture to carry out certain research. I have no knowledge of what they are doing.

Mr. HORAN. We must have these materials either in stockpile or in our own production. If we cannot produce them we have to get them by imports. And I get awfully tired of hearing people complain about the overproduction of Mr. Laird's State, for instance, in butter, when I know that there are people that can use that butter and they have the things we need. I just think our Government is awfully stupid, when the things are there and we cannot get them even though we have things we know they want.

Mr. HUNTER. Where do we get most of our castor beans now? Brazil?

Dr. CLARKSON. Yes, sir.

CURRENT RESEARCH PROGRAM ON CASTOR-BEAN PRODUCTION

Mr. HUNTER. Where are you carrying on your experiments at the present time?

Dr. CLARKSON. In California, Missouri, Oklahoma, Texas, Kansas, and Arkansas; that is where the production is primarily.

Mr. HUNTER. Is there much current production of castor beans in the United States?

Dr. CLARKSON. One hundred thousand acres being grown under a program sponsored by the Production and Marketing Administration of the Department at the request of the Munitions Board.

Mr. HORAN. Where? In California?

Dr. CLARKSON. A small amount in California but most of it in the Midwest, in Oklahoma, Kansas, and Texas, Mr. Hunter.

Mr. HUNTER. Is there much interest expressed by farmers in California to participate in the program? My own impression is that there are not many people interested in planting castor beans as long as they can do so well on other crops.

Dr. CLARKSON. That is correct. There was a good deal of interest 2 or 3 years ago but that has waned considerably. The profits in other crops are considerably greater.

Mr. HUNTER. I understand one of the most difficult problems is harvesting the beans. What is needed is a short plant so that it can be harvested with a mechanical harvester and thereby cut down on the labor cost, which I understand is the principal reason why we do not grow castor beans here but import them from Brazil because there they can be produced for a much smaller labor cost.

Dr. QUISENBERRY. That is correct about the height of the plant. Some of our experimental work is aimed at this matter of getting shorter plants which can be handled with present machinery. Also to get the type of capsule that will hold the seed for a while so they do not pop out and drop on the ground. We do have some lines now that under ordinary farming conditions stay down in the neighborhood of 3 to 4 feet in height. An important part of the castor bean project is the development of better harvesting machinery, combines that are more mobile and do a better job. That is part of this project. We think we have made considerable progress. If I might answer your question a little more regarding the California situation, as Dr. Clarkson said, a few years ago there was a great deal of enthusiasm on the production of castor beans, especially down in the Imperial Valley. Then they had some bad luck and the interest dropped off rather rapidly. We have recently seen a report from out there that the interest seems to be picking up just a little bit for this coming season.

Mr. HUNTER. The fact that cotton dropped from 45 to 30 cents a pound may have had something to do with it.

As far as climatic and soil conditions are concerned, there is no reason why we cannot grow castor beans in the United States, is there?

Dr. QUISENBERRY. No.

Dr. CLARKSON. A matter of mechanization to reduce labor costs, and of developing the plants that will be suited to mechanization.

Mr. HUNTER. I grow them in my own yard at home. They grow up to trees as high as the house in a year.

Mr. HORAN. Do I understand there is research going on to overcome this mechanical problem in growing and harvesting castor beans?

Dr. QUISENBERRY. The research includes plant breeding, and the machinery phase, that is, developing better harvesting machinery. That work is being done at Stillwater, Okla., in cooperation with a company at Oklahoma City who are actually building machines, and also in the plants where the beans are finally processed after they have been harvested. Some of the research has to do with better handling at processing plants to avoid damaging seeds, as they are brought through the pipes by air pressure and sometimes are cracked.

Mr. HORAN. Would you supply for the record the name of everybody involved in this? It is a commendable cooperation between the Government and industry.

Dr. CLARKSON. Not the names of individual workers but people who cooperate with us?

Mr. HORAN. Names of organizations with whom you have contracts.

(The material to be supplied is as follows:)

COMMERCIAL COMPANIES COOPERATING WITH THE BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING IN THE CASTOR BEAN RESEARCH PROGRAM

a. Development of equipment for planting, harvesting, and hulling:

Boardman Co., Oklahoma City, Okla.
R. C. Johnson Co., Lubbock, Tex.
Massey-Harris Co., Racine, Wis.
Redpath Harvester Co., Olathe, Kans.
The Deere Co., Moline, Ill.
The Case Co., Racine, Wis.
International Harvester Co., Chicago, Ill.
The Oliver Corp., Chicago, Ill.
Minneapolis-Moline Co., Minneapolis, Minn.
Dearborn Motor Co., Dearborn, Mich.
Ferguson Co., Detroit, Mich.
Allis Chalmers Co., Milwaukee, Wis.
Baker Castor Oil Co., 120 Broadway, New York, N. Y.

b. Varietal improvement and production studies for increased supplies:

Baker Castor Oil Co., 120 Broadway, New York, N. Y.
Western Oilseeds Co., 5743 Farris Avenue., Fresno, Calif.
Pacific Vegetable Oil Corp., 62 Townsend Street, San Francisco 7, Calif. (Through Western Oilseeds Co.)

STATE AGRICULTURAL EXPERIMENT STATIONS COOPERATING

Oklahoma Agricultural Experiment Station, Stillwater, Okla.
Texas Agricultural Experiment Station, College Station, Tex.
California Agricultural Experiment Station, Davis, Calif.
Arizona Agricultural Experiment Station, Tucson, Ariz.
Also cooperative variety testing with Missouri, Nebraska, Illinois, Arkansas, Mississippi, Tennessee, and Louisiana Stations.

Mr. LAIRD. What was the total amount you spent on this project which started in 1950?

Dr. CLARKSON. The total amount from 1950 through 1953, including work on castor bean and also work on replacements for end uses of castor beans, has been a total of $435,719.

Mr. LAIRD. Then this reduction is because of the request of the Munitions Board that this work be discontinued now?

Dr. CLARKSON. Yes.

Mr. LAIRD. A reduction of $63,000.

Dr. CLARKSON. That is right. That leaves $116,000 in this item for this work that we have just been talking about. The $63,000 will eliminate all of our chemical work to devise replacements for end uses of castor oil.

Mr. LAIRD. The rest will be used for development?

Dr. CLARKSON. Agronomic and engineering work on this crop.

Mr. HORAN. I think we have one other increase. Please discuss that program.

INVESTIGATIONS ON FIBER PLANTS

Dr. CLARKSON. Work under this project is concerned with four fiber crops which show promise of domestic production in the event of an emergency interfering with imports.

SANSEVIERIA

Sansevieria is a plant which produces hard fiber of a quality acceptable for use by the Navy for rope production. It has been found that at least one species is suitable for culture in southern Florida. We are working on the selection, testing, and multiplication of high-yielding, disease-resistant, and cold-resistant planting stock, and on the development of better cultural methods.

HEMP

Our work on hemp in western Kentucky and southeastern Missouri has been handicapped during the past year because of drought conditions. Although it is desirable to produce hemp on soils comparatively low in fertility in order to improve fiber strength, it will be necessary to overcome the drawbacks of low yields and lack of uniform growth. Breeding work is directed toward the development of strains with low marihuana content and uniform maturity among plants.

PHORMIUM

Phormium is a plant that produces a type of hard fiber. Work is under way in the coastal areas of northern California and southern Oregon. This is the only cultivated hard-fiber-producing plant that has possibilities for commercial production in the temperate climate areas of this country.

KENAF

Kenaf is a plant which produces fiber similar to imported jute, and that can be used for cotton-bale covering, electric-wire covering, twines, carpet yarn, oakum, and the like.

During the past 2 years there has been a small production of kenaf in Florida and in some of the nearby Latin American countries. In the first year, when the plantings were mainly for seed production, a great deal of loss was experienced because of inroads of a disease since identified as Colletotrichum tip blight. Last year losses from this disease were less, primarily because of better management and because the effects of the disease are not so damaging on plants grown for fiber. Major effort has been directed toward obtaining disease resistance.

Bulk selections of such seed will be increased for commercial production pending the development of stable, resistant varieties of improved quality. Other disease and insect pests affecting this crop are also being studied in detail.

The major obstacle now in kenaf fiber production is the lack of suitable equipment and methods for processing the crop. Several different methods of processing have been attempted in connection with the commercial production of kenaf, but none so far can be considered entirely satisfactory. There is very real need for accelerating the research that is being done in developing machines and processes that will reduce the amount of labor required and the amount of loss of fiber involved in the preparation of high-quality fiber.

A kenaf-ribboning machine was designed and built in 1951–52. However, this machine needs much improvement, and it should be combined with a harvester.

Laborsaving methods of extracting the finished fiber from the ribbons must be devised. Water retting of kenaf in other countries in the Western Hemisphere has produced the best fiber obtained to date, but even in neighboring countries where labor costs are less than here there is an urgent need for mechanization of water retting or chemical-mechanical extraction to keep down processing costs.

The work done to date on kenaf indicates that an early solution to the problems of harvesting and processing this crop would make it commercially feasible, at least in the southern parts of this country and in several nearby Latin American countries. It is necessary that methods and machines be improved to cut down labor costs and to produce a fiber of high quality.

We are asking an increase of $23,300 to be applied to this work.

The base on this work is $88,200, making a total of $111,500 for the fiber-production work.

Mr. HORAN. What States are those produced in, Dr. Clarkson?

Dr. CLARKSON. Kenaf is produced only in Florida. It would be possible in some parts of Texas and also in other States bordering the Gulf; but, so far it is grown only in Florida. One of the reasons we have not advocated moving into other States is that pink bollworm showed some tendency to attack this plant, and we did not want to move it about until we knew more about that threat.

Mr. HORAN. It is very commendable work. We are getting about 95 percent of our jute, as I understand from the justification, from Pakistan now.

Dr. CLARKSON. Jute and burlap come from India; raw jute comes from Pakistan.

Mr. HORAN. It just seems a shame that we are such a market for Pakistan's jute and she is such a market for our wheat and yet we have trouble doing business.

Dr. CLARKSON. I think our effort in this regard is aimed at being able, if the foreign supply is cut off, to do something about it here.

WORK UNDER WAY ON THE VARIOUS FIBERS

Mr. HORAN. Would you describe, Dr. Clarkson, each phase of the work you are doing on fiber plants?

Dr. CLARKSON. Sansevieria work is also being done in Florida, the very southern tip of the State, because this is a plant that is very

readily affected by cold and they have only 1 or 2 varieties that can be grown even in southern Florida. The work is primarily on fertilization practices, cultural practices, and producing disease-resistant and cold-resistant varieties so we might be able to push the area of production farther north.

Mr. HORAN. You feel that the prospects of that work justify continuation?

Dr. CLARKSON. Yes, we do. We found that fiber from this plant is, I guess you can say, equally acceptable with abaca for rope making. It is long fiber, hard fiber, one that handles well and machines well and makes a rope that is easy on the hands. We are doing some work also on harvesting of the plant. That is all being done in Florida at the Belle Glade Station.

Mr. HORAN. How much money are you spending on this?

Dr. CLARKSON. On sansevieria, $31,000.

Mr. HORAN. What other items? Your increase covers kenaf?

Dr. CLARKSON. The increase is for kenaf. We have for kenaf this year $26,200.

Mr. HORAN. You want to increase that by $23,000?

Dr. CLARKSON. Yes, sir. As you know, the Production and Marketing Administration is encouraging production not only in Florida but also in Latin American countries. The research on disease resistance and cultural methods and also on the processing machinery is very necessary to keep up with the production program.

Mr. HORAN. Is not kenaf the most promising project?

Dr. CLARSKON. Yes, sir.

Mr. HORAN. That accounts for $88,200?

Dr. CLARKSON. $26,200

Mr. HORAN. You have $88,200 in this budget.

Mr. STRUTTMANN. $20,000 is for work on phormium, $11,000 on hemp, and $31,000 on sansevieria.

Mr. HORAN. How promising is our attempt to raise hemp in the United States?

Dr. CLARKSON. It has been shown that it can be raised. It has been raised heretofore on pretty highly fertile land. The effort here is to devise strains and cultural practices that would permit it to be raised on less valuable lands in case of emergency. There was quite a program during the war as indicated a moment ago and most of that was in the Great Lakes area, on high-priced land.

Mr. HORAN. If we were to cut your budget, which one of these projects would you drop?

Dr. CLARKSON. We would have to consult with the Munitions Board.

Mr. HORAN. Or they would have to consult with you.

Dr. CLARKSON. Kenaf is the one that shows greatest promise at the moment of paying off sooner than the others. The others are in the long-range stage. Certainly we cannot show any great developments within a year or so. It is something to be continued over a number of years if it is to show any good results.

We have worked with sansevieria, for quite a number of years. It is going to be quite a number of years yet before we are able to say that this is a crop that can be grown successfully commercially in southern Florida. So, as with all research, it is a question, having

gone so far, whether we should stop in the middle and put the money on something else.

Mr. HORAN. I appreciate that. I hope you appreciate why I asked you that question.

Mr. LAIRD. I met with hemp farmers in Wisconsin on Tuesday and they certainly have a good crop there in Wisconsin.

Dr. CLARKSON. There is no doubt that hemp can be grown successfully in Wisconsin. However, for a period of emergency when land is at a premium for all needed crops, it seems to be important that we be able to grow it on less valuable lands.

Mr. LAIRD. The hemp plants built during World War II in Wisconsin have been sold for 10 cents on the dollar to canners in most cases.

TANNIN PILOT PLANT

Mr. HORAN. What results are you obtaining from the pilot plant up at the eastern regional laboratory on tannin?

Mr. SPEH. The pilot plant is just being completed.

There was delay in getting fermentation equipment to take care of the sugars present. The Eastern Regional Laboratory is having a break-in run now so as to be able to properly coordinate the throughput of each piece of equipment. The pilot plant should be in operation, I would say, any day now to actually give us yield and cost data, to produce extract and get powder to tan the hides.

Mr. HORAN. Very well. When do you think we will have the results?

Mr. SPEH. I would say we ought to be able to get some data on costs, on yield, throughput, and so forth, within 2 or 3 months, using the dried, shredded roots of canaigre.

Mr. HORAN. Very well. Thank you, gentlemen. If there is nothing further we will adjourn until 9:30 Monday morning.

MONDAY, MARCH 9, 1953.

BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS

WITNESSES

DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION
DR. HAZEL K. STIEBELING, CHIEF, BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS
DR. RUTH O'BRIEN, ASSISTANT CHIEF, BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS
DR. CALLIE MAE COONS, ASSISTANT CHIEF, BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS
MISS CECELIA HUNEKE, ADMINISTRATIVE OFFICER, BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

SALARIES AND EXPENSES

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$1,436,000	$1,399,202	$1,565,000
Reimbursements from non-Federal sources	421	650	650
Reimbursements from other accounts	3,048	1,535	
Total available for obligation	1,439,469	1,401,387	1,565,650
Unobligated balance, estimated savings	−1,457		
Obligations incurred	1,438,012	1,401,387	1,565,650
Comparative transfer from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	14,900	14,500	
Total obligations	1,452,912	1,415,887	1,565,650

NOTE.—Reimbursements from non-Federal sources above are from proceeds of sales of charts (7 U. S. C. 1387) and personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Food and nutrition investigations	$619,712	$578,242	$729,540
2. Family economics investigations	448,153	449,960	449,960
3. Textiles and clothing investigations	222,528	224,200	224,200
4. Housing and household equipment investigations	159,050	161,300	161,300
5. Obligations under reimbursements from non-Federal sources	421	650	650
Total direct obligations	1,449,864	1,414,352	1,565,650
Obligations Payable Out of Reimbursements From Other Accounts			
2. Family economics investigations	600		
4. Housing and household equipment investigations	2,448	1,535	
Total obligations payable out of reimbursements from other accounts	3,048	1,535	
Total obligations	1,452,912	1,415,887	1,565,650

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	243	227	258
Full-time equivalent of all other positions	3	4	1
Average number of all employees	233	227	253
Average salaries and grades:			
General schedule grades:			
Average salary	$5,083	$5,131	$5,094
Average grade	GS–7.5	GS–7.5	GS–7.5
Crafts, protective, and custodial grades:			
Average salary	$2,720	$2,731	$2,688
Average grade	CPC–2.3	CPC–2.3	CPC–2.4
Ungraded positions: Average salary	$3,106	$3,077	$3,106
Personal service obligations:			
Permanent positions	$1,099,686	$1,072,320	$1,199,490
Part-time and temporary positions	8,174	12,391	1,900
Regular pay in excess of 52-week base	4,071	4,076	4,150
Payments to other agencies for reimbursable details	4,823	2,090	
Total personal service obligations	1,116,754	1,090,877	1,205,540
Direct Obligations			
01 Personal services	1,114,306	1,089,342	1,205,540
02 Travel	16,423	13,960	20,860
03 Transportation of things	643	500	500
04 Communication services	10,319	10,400	10,400
05 Rents and utility services	1,060	900	900
06 Printing and reproduction	33,955	58,100	58,100
07 Other contractual services	131,150	95,000	102,000
Services performed by other agencies	106,246	111,250	122,450
08 Supplies and materials	23,071	22,800	26,600
09 Equipment	10,822	10,100	14,600
13 Refunds, awards, and indemnities: Awards for employee suggestions	115	300	300
15 Taxes and assessments	1,754	1,700	3,400
Total direct obligations	1,449,864	1,414,352	1,565,650
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	2,448	1,535	
06 Printing and reproduction	600		
Total obligations payable out of reimbursements from other accounts	3,048	1,535	
Total obligations	1,452,912	1,415,887	1,565,650

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$271,776	$304,783	$350,985
Obligations incurred during the year	1,438,012	1,401,387	1,565,650
	1,709,788	1,706,170	1,916,635
Deduct:			
Reimbursable obligations	3,469	2,185	650
Unliquidated obligations, end of year	304,783	350,985	352,985
Adjustment in obligations of prior years	696		
Obligated balance carried to certified claims account	3,280		
Total expenditures	1,397,560	1,353,000	1,563,000
Expenditures are distributed as follows:			
Out of current authorizations	1,210,601	1,124,200	1,260,000
Out of prior authorizations	186,959	228,800	303,000

Mr. ANDERSEN. The committee will come to order.

Dr. Stiebeling, we are glad to have you with us this morning, and we also welcome the representatives of your Bureau here today.

Before we commence with your general statement, we will have pages 112, 113, and 116 through 120 of the justifications inserted at this point.

(The material referred to is as follows:)

PURPOSE STATEMENT

The Bureau was established on July 1, 1923, absorbing the Office of Home Economics which had been in existence since 1915 as an enlargement of The Human Nutrition Investigations authorized by the Congress in 1894.

Research is carried on through laboratory and field studies in cooperation, wherever possible, with other bureaus of the Department, other Federal agencies, and with State research agencies, particularly State agricultural experiment stations. Studies include research on:

Food and nutrition, to determine the nutritive contributions of different foods to the diet, the comparative costs of foods, the food and nutritional requirements of people, and how these facts can be applied by families in differing circumstances to the buying of food, the preparation of healthful meals, and the preservation and care of food in the home.

Family economics, to determine the quantities of different foods and other goods and services consumed by families in various regional and economic groups; to evaluate the economy and nutritional adequacy of diets and to study the factors such as income, prices, and family size that affect family expenditures for living.

Textiles and clothing, to determine the relative usefulness and cost of fabrics and garments differing in material, construction, design, and finish, for the purpose of developing specifications for products that better meet consumer needs, and of assisting consumers in their selection and care of fabrics, garments, and household textiles for various uses.

Housing and household equipment, to determine the housing needs of families for efficiency and comfort as a basis for developing plans for rural houses and for adequate and efficient work and storage centers, and to assist families with the selection, care, and use of household equipment.

Laboratory work is performed at the Agricultural Research Center, Beltsville, Md., and at 16 locations in cooperation with research institutions in the States. The staff employed on November 30, 1952, numbered 264, of whom 158 were located in the field.

Appropriated funds:		
Appropriated, 1953		$1,413,702
Budget estimate, 1954		1,565,000
Salaries and expenses		
Appropriation Act, 1953		$1,400,000
Reductions pursuant to:		
Section 411	$758	
Section 412	40	
		−798
Activities transferred in 1954 estimates from "Salaries and expenses, Office of Administrator, Agricultural Research Administration" for services at the Agricultural Research Center		14,500
Base for 1954		1,413,702
Budget estimate, 1954		1,565,000
Increase (for studies on diet and food utilization to avoid premature human physical impairment, reduce waste, and assure maximum edible yield of foods of high nutritional quality)		+151,298

Project statement

Project	1952	1953 (estimated)	Increase	1954 (estimated)
1. Food and nutrition investigations	$619,712	$578,242	+$151,298	$729,540
2. Family economics investigations	448,153	449,960		449,960
3. Textiles and clothing investigations	222,528	224,200		224,200
4. Housing and household equipment investigations	159,050	161,300		161,300
Unobligated balance	1,457			
Total available or estimate	1,450,900	1,413,702	+151,298	1,565,000
Transfer in 1954 estimates from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	−14,900	−14,500		
Reductions pursuant to secs. 411 and 412		+798		
Total appropriation or estimate	1,436,000	1,400,000		

Status of Program

Current activities

The research of the Bureau of Human Nutrition and Home Economics consists of both laboratory and field investigations, many under cooperative or contract arrangements with other research organizations. It includes:

1. *Food and nutrition.*—Determining the nutritional requirements of people; the composition and nutritive value of food to meet these needs; the best use of agricultural products, including food selection, care of food in the home, and the most suitable methods of home food preparation and preservation.

Current research includes studies of the requirements of normal individuals for energy and selected nutrients; food intake in relation to nutritional status; the physiological availability of food energy, protein, and ascorbic acid from selected foods; the distribution in foods of selected amino acids, fatty acids, vitamins, and other nutrients; improved methods of household preparation as related to the quality of food, including the development of recipes for effective food use in homes and institutions; and investigations of food spoilage organisms as related to food conservation and wholesomeness.

2. *Family economics.*—Investigating problems of household buying, and the adequacy and relative economy of the food, clothing, and other goods and services that are consumed by various population groups, particularly the major items of household expenditure which serve as indicators of farm family living standards.

Special emphasis is being given to studies of the living achieved by farm families; factors affecting clothing utilization, food consumption and dietary adequacy of urban and rural families; periodic appraisal of the nutrient content of national food supplies; compilation of available data on the composition of foods as marketed and as prepared for eating; and development of guides for food management.

3. *Textiles and clothing.*—Emphasizing studies to assist homemakers with the selection, use and care of family clothing and textile house furnishings, and to help producers in the development of fibers, fabrics, and garments for specific consumer uses.

Research is in progress on technical problems pertaining to consumer use and quality of clothing and household textiles; serviceability in actual use of fabrics of known composition and construction; causes of deterioration of fabrics during use; and the relative efficiency of various household detergents in fabric reconditioning.

4. *Housing and household equipment.*—Involving studies of the housing needs of families and development of plans for rural houses with efficient work areas, adequate storage space, and arrangements for satisfying family living; and research to improve the selection, care and use of household equipment.

Work under way includes cooperative work with the Bureau of Plant Industry, Soils, and Agricultural Engineering on the development of house plans for regional plan exchange services; preparation of interregional reports on housing needs of rural families; the determination of adequate space and other facilities for effective home food preservation and for clothing construction and repair; studies of the operating characteristics of home laundry equipment.

Selected examples of recent progress

Following are examples of progress in these fields during the past year.

1. *Nutrition of 14- to 16-year-olds.*—Information on diets and nutritional status of children of high school age has been gained from a study in four Oregon counties completed this year in cooperation with Oregon Agricultural Experiment Station and dental and health authorities. While the general picture of the health of the children, as measured by biochemical and physical indicators of nutritional state and by dietary intake, was good, an appreciable number of children rated relatively low for several blood constituents. Children living inland had higher serum vitamin A, higher hemoglobin values, and less dental decay than children living on the coast. In general, the boys' diets were better nutritionally than the girls', except in ascorbic acid.

2. *Dietary deficiency.*—Little has been known as to whether dietary deficiencies work greater hardship on one sex than the other. Findings that may have a bearing on human malnutrition have been published this year—from studies of experimental rats. On diets deficient in either quality or quantity of protein, adult female rats were less seriously affected and had a lower death rate than male rats; in younger rats, the females were less seriously retarded in growth. When diets are adequate in all respects, young male rats gain weight more rapidly than the female.

3. *Vitamin values.*—In earlier experiments, the Bureau found that the carotene in leafy green vegetables was at least twice as good a source of vitamin A as the carotene in yellow vegetables. A possible explanation for the difference was xanthophyll, a substance abundant in leafy greens but almost entirely lacking in yellow vegetables. However, the Bureau has made tests which show that the superiority of green leafy vegetables over yellow ones in the availability of their carotenes cannot be attributed to their higher xanthophyll content.

4. *Calcium in bread.*—The Bureau has analyzed calcium content in 402 samples of commercial white bread from 41 States and the District of Columbia. Calcium content differed so much that an individual eating a city dweller's average of 1½ pounds of commercial white bread per week could get as little as 1 percent of his calcium requirement from bread or as much as 16 percent, depending on baking practices. Calcium is a nutrient frequently low in diets the country over, as compared with current dietary recommendations.

5. *Yield of purchased food.*—Investigations during the past year have provided information on edible yield from hams, poultry, apples, potatoes, and a number of other fruits and vegetables, as purchased. Food industries and consumers alike want to know how much usable food to expect from commodities bought in various forms, under differing market conditions, and wanted for different purposes. Such information also has special importance for Bureau tables showing the yield in nutrients from a unit of weight as purchased.

6. *Home-cooking research.*—Short cuts in cooking familiar foods—dry beans, peas, lentils—and an easy and attractive way to prepare a new type of food, small turkeys, are two results this year of Bureau research to develop new and varied ways of using abundant foods. To speed home preparation of dry beans, the Bureau suggests a quick method of soaking and provides directions for pressure cooking which overcome problems that homemakers have encountered. The Bureau has developed directions for roasting young fryer turkeys.

7. *Flavor of food altered by production practices.*—Palatability tests by the Bureau showed no significant differences in tenderness, moistness, or turkey flavor in turkey fryers treated with estrogens in finishing. It was found, however, that starting diets for turkeys containing certain fish oils and fish meals had an adverse effect on flavor. In view of expanding production of broiler-fryer and light roaster turkeys, this finding is important in relation to the amounts of fish products that can be used in starting diets.

8. *Food guide for older folks.*—As the proportion of older people in our population increases, more calls come for help in meeting dietary needs of this age group. Issued during the past year a Food Guide for Older Folks presents in popular style nutrition facts, diet suggestions, and some solutions to common food problems.

9. *Improved construction of women's clothes.*—Help with problems of clothing construction is provided by two new publications based on the Bureau's research. For the home sewer who makes or alters clothing, Fitting Women's Coats and Suits pictures and explains ways to correct common faults in home-tailored or readymade garments. A technical report provides evidence of the relative

durability of seams, patch pockets, and buttonholes made in different ways during construction of cotton housework dresses or children's clothes.

10. *Farm and city wardrobes.*—Information on consumer stocks of clothing, needed by economists, businessmen, teachers, and research workers, is becoming available through studies in a few localities. The sixth in a series of reports presents tabulations of clothing inventories of farm families in two Minnesota counties and a farm-city comparison. In general, kinds of clothing owned by farm and city families are similar except for work clothes. The two groups differ chiefly in quantity of clothing owned and money spent for it. Farm men spent less than two-thirds as much for clothes as city men; farm women spent less than half as much as city women.

11. *Disinfectants used in laundering.*—The Bureau previously found that solutions of disinfectants recommended by manufacturers for uses in laundering children's clothing and bedding were, in general, too weak to be effective. The Bureau has now determined the proportions required of five compounds (sold under various trade names) in the rinse water, to be effective for (1) preventing ammonia formation in fabrics; (2) sanitizing the fabric by reducing bacterial count to one-tenth of 1 percent; (3) completely disinfecting the fabric. Wide differences were found among the disinfectants as to strength of solutions required when fabrics were treated at different temperatures and for different lengths of rinsing periods.

12. *Living levels of rural families.*—Spending and consumption patterns of rural families have been studied in two Mississippi counties in which industrialization has increased the proportion of rural families with income from nonfarm sources. Rural nonfarm families, many of whom produced some food for home consumption had the highest levels of living, as judged by available indicators. Families living on farms, who sold little or no farm produce and derived most of their incomes from off-farm work had higher living levels than those who farmed on a larger scale. This is one of a series of studies in rural communities to provide clues to changes in consumption since the national survey of 1942.

13. *Planned spending.*—A publication on planned spending found useful during World War II to aid women in Government service in their money management, has been brought up to date using recent available reports of actual expenditures by women workers, at the request of personnel officers of the Federal Government. This study, in addition to meeting the specific request, also provided a test of methods of analysis and presentation that are applicable to families.

14. *What families want in farm housing.*—Completion of four regional rural housing surveys has brought together a large fund of information on the kind, scope, and frequency of household activities carried on by farm families in different parts of the country. The studies undertaken cooperatively by the Bureau and 34 State agricultural experiment stations, also show family preferences for the location of different activities in the home and for certain other house features. Findings are now being used in establishing desirable space standards and in developing plans for functional rural homes of the future.

15. *Expansible farmhouses.*—Because the expansible type of house provides a satisfactory home for a man and wife for relatively low cash outlay and can be added to without altering the basic unit, the Bureau has continued work on developing expansible-house plans in cooperation with the Bureau of Plant Industry, Soils, and Agricultural Engineering. Six such plans have been completed and plans and working drawings for five of these houses are available to farmers through the regional plan services of the Department.

Statement of obligations under allotments and other funds

[Includes only those amounts which, by Nov. 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases.]

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, agriculture (Bureau of Human Nutrition and Home Economics): Marketing research	$8,700	$6,500	$7,000
National school-lunch program, Production and Marketing Administration (Bureau of Human Nutrition and Home Economics): Nutritional requirements of school feeding programs and specifications and guides for major school lunch equipment	30,675	40,000	40,000
Working funds, agriculture, Bureau of Human Nutrition and Home Economics, advanced from Department of Defense, Department of the Army: To develop composition and nutritive value data on beef suited to the needs of the Armed Forces	53,421	40,000	----------
Miscellaneous contributed funds, Department of Agriculture (Bureau of Human Nutrition and Home Economics) (trust fund deposited by National Electrical Manufacturers Association): Comparison of fuels for home cooking, refrigeration, and water heating	2,742	5,221	----------
Obligations under reimbursements from governmental and other sources: Salaries and expenses	3,733	2,185	650
Total, obligations under allotments and other funds	99,271	93,906	47,650

Mr. ANDERSEN. We will be very glad to have a general statement on your work at this time, Doctor.

Dr. STIEBELING. Thank you, Mr. Chairman.

I had thought, in consideration of new members of the committee, that I might present the work of the Bureau with somewhat broader orientation than has been necessary for the last few years.

Mr. ANDERSEN. That will be fine.

Dr. STIEBELING. However, Mr. Marshall, who, I understand, has been associated with the Farmers' Home Administration, already knows much about home economics.

Mr. ANDERSEN. Mr. Marshall worked with the Department quite a few years in Minnesota and is well acquainted with many of these matters. I do not know just how specifically, however, he is acquainted with your particular Bureau. We will let you proceed on the assumption that whatever information you care to give us will be welcome.

Dr. STIEBELING. Thank you, Mr. Chairman.

GENERAL STATEMENT

The Bureau traces its history in the Department of Agriculture to the Agricultural Appropriation Act of 1894, by which the Congress provided $10,000 for the study of human nutrition. Then, in 1915, following the establishment of the Extension Service in the Department, an Office of Home Economics was created, which was authorized to continue these nutrition investigations and to undertake other research in home economics. This office was the nucleus of the Bureau of Home Economics, which was organized in 1923, and then renamed the Bureau of Human Nutrition and Home Economics 20 years later, after the Bureau had become one of the constituent agencies of the Agricultural Research Administration.

HOME ECONOMICS AND RESEARCH UTILIZATION

Many people are not familiar with the scope of home economics as a field of learning, and, so, I might say home economics is concerned with the application of science to the major problems of the household and the well-being of the family. In research, it is concerned with the application of science to the problems of food and nutrition, textiles and clothing, housing, household equipment, home management, child development and family life. This means the application of sciences such as chemistry, physics, physiology, bacteriology, sociology, psychology, economics, and statistics to these problems. Our Bureau does not undertake research in all these aspects, however.

Our authorization, as you know, provides for investigations into the relative utility and economy of agricultural products for food, clothing, and other uses in the home, and such economic investigations, including housing and household buying, as have for their purpose the improvement of the rural home.

And so, the problems in human nutrition and home economics which our Bureau undertakes to study are those that are related to the end uses of agricultural products in the home and problems of rural family living. We feel that good solutions to those problems are important for homes everywhere and to agriculture as an industry.

As a constituent bureau of the Agricultural Research Administration, of course, our primary business is research. In home economics, as in every other field of learning, there is need for continuing research to strengthen the background of subject matter. Our research is carried on both independently and in cooperation with the other research bureaus of the Department. Practically every agency in the Department uses in its programs some information that comes from our research.

In home economics as in agriculture, research, extension, and resident teaching are associated in the land-grant college-United States Department of Agriculture relationships. Through these relationships our research helps to strengthen the subject matter background of home economics.

There are now some 67,000 students in colleges and universities throughout the country who are preparing to be leaders in home economics, as teachers and in homemaking, and at the present time there are about 1,750,000 students in high schools who are studying homemaking. Home economics and agriculture are parallel and coordinated lines of work in the cooperative extension service of every State, and through these channels home economics reaches millions of families every year.

This close relation between research, resident teaching, and extension service, as we have in the Department and land-grant colleges, has been highly successful in this country in helping to raise standards of living. In fact, it is an American invention. No place else in the world do you have this relationship, and many countries, recognizing its success, are seeking to emulate it.

RESEARCH DIVISIONS

The Bureau of Human Nutrition and Home Economics operates in four research divisions: Food and Nutrition, Family Economics, Textiles and Clothing, and Housing and Household Equipment. Three of these Divisions require laboratory facilities and, hence, are located at the Agricultural Research Center, Beltsville, Md. The Family Economics Division is housed here in Washington. We also have some employees stationed in a number of States, cooperating, on request, in research on problems of regional and national significance. In addition, too, under the authority of the Research and Marketing Act of 1946, we are sponsoring contract work in a number of locations.

RESEARCH PROGRAM DEVELOPMENT

In developing the overall research program of the Bureau, we take into account recommendations that come from various outside sources, together with the ideas that emerge from our own work and thinking. Each year we look critically at our current program and make decisions about program direction within the framework of our authorization and available funds, and in light of the need to advance basic knowledge, as well as to develop solutions to practical problems.

Among the factors that determine the emphasis of the Bureau's work are recommendations made by advisory committees. Some 20 committees, established under the authority of the Research and Marketing Act of 1946, review various segments of our program. About 80 percent of our research is reviewed at the present time by these groups. In addition, a committee of the American Home Economics Association meets with us once or twice a year to advise on all phases of our program. This association, which now includes about 20,000 members—all college-trained home economists—was influential in the establishment of the Bureau 30 years ago and has maintained a continuing interest in its work.

Another factor that determines the emphasis of our program are the problems of rural families as they are brought to us by the Farmers' Home Administration and the Extension Service. Still another, are the adjustments that may be needed in the use of food or clothing, or other everyday goods in consideration of national situations. In the past, adjustments have been necessary because of conditions brought on by depression, war, or by surpluses or shortages of various goods. Illustrative of the pressure for information in circumstances of that sort, was the wartime demand for our publications in 1943. In that year 28 million copies of publications were distributed upon request.

In addition, our program is influenced by proposals for research made by regional technical committees and by other groups, such as the National Research Council, the Association of Land-Grant Colleges and Universities, and various scientific societies.

RESEARCH STUDIES PERTAINING TO FOOD AND NUTRITION

The relative support given each research division this year and the emphasis being placed upon different aspects of programs dealing with food, clothing, shelter, and economic problems of the home is shown

by chart. Well over half of our research efforts goes into problems of food and nutrition. This research deals with nutritional requirements and the response of the body to diets; the table quality of foods and factors affecting it and how to maintain or enhance those table qualities through food preparation and preservation; the contribution that foods can make to the diet because of their composition and nutritive value; an assessment of the kind of diets families in different parts of the country, in different income groups, are getting; and finally, with food budgets and other educational materials that may help consumers get better meals for their money. This kind of information is essential background for programs to improve household utilization of food.

I would like to talk a little about the first item—nutritional requirements and the response of the body to diets of different kind. Everyone knows that the kind and amount of food people eat affects health and vitality, but I think the general public does not realize how thin the foundation is for some dietary recommendations. As a matter of fact, there is only partial information on how much of any one nutrient is needed by people in different stages of their development—in childhood, in adulthood and in old age, and there is even less information for all of the 50 or so known substances that we must get from food.

We are using part of our current funds for study of these nutrient requirements. This work is under way at Beltsville and also in a number of States under cooperative or contract arrangements. At the present time, we are determining human requirements for certain of the vitamins, for fatty acids, for essential amino acids of proteins, and for food energy. Also, in cooperation with State experiment stations and medical groups, we are studying the level of nutritional health that is supported by the different kinds of diet consumed in different parts of the country—in other words, studies of the relation of food intake and nutritional status of selected population groups in different parts of the country.

Knowledge derived from research into nutritional requirements has contributed measurably to human welfare in this country. For example, rickets or scurvy among children is rare, now that we know vitamin D rich milk and vitamin C rich orange juice will prevent these conditions. Vitamin D milk and orange juice now are standard parts of the diets of young children. We also have found that as families have been able to buy more of the kind of foods they need and want, that there has been a marked reduction in the incidence of pellagra, a diet-deficiency disease which was common in the South years ago. As people have consumed more meat, milk, and enriched cereals and bread, the incidence of this disease has dropped steadily. For example, in 1936, there were more than 3,700 deaths reported from pellagra. In 1942, as people had more money to spend for milk and meat and as bread and flour was enriched with certain vitamins, the number of deaths dropped to about 1,500 and in 1949 to about 300.

In this country there now are relatively few nutritional diseases that are the result of too little of certain nutrients, as we now understand them, but there are other kinds of urgent nutritional problems that we do not yet know how to handle. For example, diet seems to be a factor in the development of certain metabolic disturbances that result in the impairment of certain organs, such as you find in renal-cardiovascular diseases—diseases of the kidney, heart, and circulatory system. At present, we do not know how to deal with this kind of

nutritional problem, because we do not know enough about the functions of vitamins and minerals in the diet, or even of the long-term effects of different proportions of proteins, fats, and sugars in the diet.

COOPERATIVE STUDIES

Our Bureau, along with other agencies, however, is attempting to get better understanding of this problem. The College of Medical Sciences of the University of Minnesota for a number of years has been studying the health history of some 300 business and professional men from middle age on, because it is in this age and occupational group that you find the highest incidence of this type of problem. And because it is generally agreed that diet is in some way related to the onset of these diseases, the medical scientists of the Laboratory of Physiological Hygiene there have asked us in the Bureau to cooperate with them in their study of this condition, by making quantitative studies of the food habits of the men whom they are studying. So, this spring, we are undertaking the study of the diets of about 60 of these men, using for the purpose funds that have been released by the completion of some other of our food and nutrition investigations. Paralleling these studies, we are trying to find why some types of diet seem to accelerate this physical damage, by controlled studies using the laboratory approach with experimental rats at Beltsville.

OTHER BUREAU STUDIES

In addition to studying human requirements in the ways I have described, we also are investigating the nature of or values in food, fabrics, and other goods which determine the contribution that they can make to the satisfaction of human needs and wants: how to maintain the values of these goods as they are used; and how to get the best out of whatever goods people have available.

For food, this means acquiring information on the table quality or nutritive value of different products and how these are affected by processing in the household. It also means comparing the diets people are now getting with our present knowledge of what people need, and then making suggestions for improvement, to get the most good from food through good combinations in meals and through proper food preparation and preservation.

For clothing and household fabrics, this means studies of the relationship of their composition and construction in relation to their serviceability or suitability for different purposes. It also means determination of the ways of using, reconditioning, and caring for different fabrics which is important, particularly when fabrics are made of natural fibers, combined with the new and less well known fibers.

For equipment, this means comparing the materials, the mechanisms, and the efficiency of equipment on the market which can be used for the same purpose, in relation to original cost and requirements for installation and maintenance, as well as to performance under conditions likely to be encountered in the home.

In short, our research in all of these areas is designed to acquire information that can be used by the teacher, extension worker, and others in helping families make selections that are suited to their

needs and to properly use and care for the goods they buy. This is basic to effective utilization of our national resources.

Our current funds for housing are being used in cooperative studies with regional groups to acquire basic information to improve planning of the house. We are now taking part in a coordinated series of researches with the States to determine the amount and best arrangement of space needed for various types of work and for the storage of household possessions. We also work with the agricultural engineers of the Department in seeing that the results of research as they are available, are incorporated in the development of new house plans for use through the Extension Service.

FIELDS OF EMPHASIS IN CURRENT RESEARCH PROGRAM

The next chart compares funds for the Bureau's current program in research with that of the Department as a whole. A little more than 3 percent of the total funds for research in the Department are used through the Bureau of Human Nutrition and Home Economics. That amounts to about 1 cent a year for each person in the population. None of our research is directly related to production problems. Only a small portion is directly related to marketing.

We feel that the Bureau could be used more fully in marketing studies, because, after all, the purchases of household buyers are an important aspect of marketing. What the consumer needs and wants should be taken into account and reflected in both production and marketing practices.

The largest segment of our work is concerned with proper utilization of food and fabrics. Nevertheless, the percentage of the total utilization work of the Department done through the Bureau is smaller than its percentage of the research in farm and family economics or even the percentage done on problems of farm and home engineering and structures.

PERSONNEL REDUCTIONS

Over the last 4 years, the size of the Bureau staff has been progressively reduced. That came about, of course, from a combination of increased costs of operation and decreases in appropriations. At the present time our staff numbers about 100 fewer people than in 1950. That is, our staff is about two-thirds the size it was in 1950.

Mr. ANDERSEN. Doctor, how many do you have on your staff now? You say there are 100 fewer now than in the past.

Dr. STIEBELING. There are about 240, I believe, at the present time.

Mr. ANDERSEN. All right, go ahead.

RESEARCH PUBLICATIONS

Dr. STIEBELING. As a research bureau, our output contributes to the advancement of knowledge in nutrition and home economics in terms of technical facts and the development of principles obtained through technical studies. We report these results first in technical publications. These include technical Department bulletins printed by the Government Printing Office and articles in scientific publications. For example, we report the results of research in the Journal of

Biological Chemistry, the Journal of Nutrition, Food Technology, Archives of Biochemistry and Biophysics, the Journal of Textile Research, and in engineering publications covering household equipment. More than half of our publications fall in the category of technical reports.

But, inasmuch as the final objective of our work is the application of this knowledge to problems of the home, we are also concerned with putting results of research into terms which can be readily used by teachers and by families themselves. This means translating our technical material into popular form so that it can be released in the Farmers' Bulletin, the Home and Garden, or the leaflet series of the Department. We also supply suitable versions of our findings to womens' magazines.

The Bureau is continuously pressed to publish material in very simple language for the relatively inexperienced young homemaker, and families that have had relatively few educational opportunities. The Department has been giving a good deal of attention to this matter of readability of its publications, chiefly with these unlettered and inexperienced persons in mind. In an effort to write simply and to prepare material that can be readily understood, we are sometimes accused of saying the obvious, or saying things "that everyone knows." Well, we try to judge the needs of our readers by the questions that are asked us by visitors to the Bureau, by the recommendations that are made by the Farmers' Home Administration and the Extension Service and by the many letters that come directly to us. It is obvious that much of our heavy correspondence comes from persons who have had very little schooling, or who can be reached only by very easy-to-read publications.

A recent report of the Office of Information of the Department lists seven publications prepared by the Bureau among the 10 most in demand from the Department this past year.

In the explanatory notes, which the chairman has asked be put into the record, we have given a brief description of the current activities of each of the divisions, together with a dozen or so selected examples of progress during the past year. Each of these examples represents a contribution to the expansion of knowledge that is needed in nutrition and home economics. These advances are parts of a much bigger picture. They can be fully appreciated only in relation to past research, to investigations that are now under way and to other work still to come. The 1954 budget includes some increase in funds for our research activities.

Mr. ANDERSEN. We will go into those later, Doctor. First, please complete your general statement.

PUBLIC NEED FOR RESEARCH

Dr. STIEBELING. I was merely going to end by saying that the country depends heavily upon our Bureau for scientific background, needed for teaching and extension programs in nutrition and home economics. Although both the Department and the experiment stations have worked diligently in using available funds to provide improved background of knowledge, there is still a great deal to be done. Too much teaching is still being based on tradition or personal opinion, because the necessary research-based facts have not been

established. In such circumstances much of what is taught is conflicting and is confusing to the public.

A growing research-based body of knowledge in nutrition and home economics is fundamental to the education of the consumers in the use of agricultural products and to the guidance of producers in better adapting their products to consumer needs. The results are also needed by families and public leaders in determining how to make the best use of our country's resources. The problem of carrying forward an effective research program that will contribute to this is one that is ever with us. We continually give attention to improving the management of our funds so as to make the most effective use of them on the most important problems. I think that about completes my general statement.

PUBLICATIONS

Mr. ANDERSEN. Doctor Stiebeling, you have mentioned very briefly the item of publications. This is an essential item as you stated last year, and I wish to quote your words—

> Publications are the final result of research and their number and quality are in a sense a measure of performance.

How many new publications did you put out in 1952? You may supply that for the record, if you do not have it available at this time.

(The information requested is as follows:)

> During the fiscal year 1952, 52 technical and semitechnical articles were published in professional and trade journals; and 27 printed and 8 processed publications were issued. In addition, 80 popular articles were prepared for press or magazine use, and 16 radio or television broadcasts were made.

MOTION PICTURE FILMS

Mr. ANDERSON. What are you doing in relation to new films and motion pictures?

Dr. STIEBELING. We feel that film strips that can be used by extension workers or teachers are a very important part of popular presentation of research findings. We have been working cooperatively with the extension service and prepared some during this past year.

Mr. ANDERSEN. How many of those did you prepare?

Dr. STIEBELING. We made one on rural family living to be used by home management specialists in "outlook" work. This included 35 frames in color. We also revised our motion picture on the work of the Bureau called research for better living. We have in preparation a slide film, in color, on freezing strawberries and peaches; one on freezing broccoli and corn. We also prepare slides to illustrate talks given by Bureau staff members before professional societies.

Mr. ANDERSEN. Do you find that these are quite popular?

Dr. STIEBELING. We prepare the slide films in cooperation with the Extension Service and they take over the cost of their production and distribution to the extension agents.

Mr. ANDERSEN. I presume they are used quite extensively by the home demonstration agents?

Dr. STIEBELING. Yes, sir.

STRUCTURE AND ACTIVITIES OF THE INFORMATION DIVISION

Mr. ANDERSEN. In relation to your general information program, I would like you to describe briefly the work of your Information Division.

Dr. STIEBELING. We consider our Information Division really a part of the technical research divisions because we feel research is not finished until the results get out to the public——

Mr. ANDERSEN. I am in full agreement with you on that point. After all, there is no use doing this research unless we make it available to the people who can use it.

Dr. STIEBELING. We have 18 people in our information division, organized into three sections. One section, the largest, deals with the preparation of publications, popular and technical. This includes people who do the editing, preparing of copy for the printer, preparing illustrations and layout, proofreading, and arranging for distribution as well as those who keep the necessary records. In this group also are writers who help the scientists prepare both technical and popular publications. Usually, the scientists who are skilled in the laboratory, are not expert in presenting their ideas clearly and effectively. We feel it is good use of manpower to supplement them with editorial assistance.

EFFORTS TO AVOID DUPLICATION IN INFORMATION SERVICE

Mr. ANDERSEN. What steps do you take to prevent duplication between your information staff and that in the office of the Administrator of ARA, and the general information office of the Department of Agriculture?

Dr. STIEBELING. We do all the work of preparing our publications for the printer. These are reviewed by both the Office of Information and the ARA Office of Administrator for policy. They are reviewed by the printing section of the Department's Office of Information by the person who is the liaison between our Department and the Government Printing Office.

Mr. ANDERSEN. You would say, then, that there is very little possibility of duplication in work?

Dr. STIEBELING. There is no duplication of work. A second section of our information division deals with visual materials. This staff is made up of draftsmen and artists who prepare illustrations and charts and who work on slide films and help with the preparation of motion pictures, when we do any. The third section does what is ordinarily thought of as information by many people. This staff prepares material for press, radio, and television release, and answers the many questions that come day by day by mail and telephone from representatives of the press, radio, and industry. We have 2 persons who spend part time on that.

LEGISLATIVE AUTHORITY FOR THE BUREAU

Mr. ANDERSEN. What is the legislative authority for your program, Doctor, and just what does it provide? You may extend your remarks in the record, if you desire.

Dr. STIEBELING. I shall do that.

(The statement is as follows:)

The work of the Bureau is conducted by virtue of authority included in the act establishing the United States Department of Agriculture, the Department of Agriculture Organic Act of 1944, the annual appropriation acts providing funds for the activities of the Bureau, the Bankhead-Jones Act of 1935, the Research and Marketing Act of 1946, and other pertinent legislation.

RESEARCH WORK AS IT RELATES DIRECTLY TO AGRICULTURE AND THE CONSUMER

Mr. ANDERSEN. How much of your work is related directly to agriculture, as opposed to the consumer generally, urban as well as rural?

Dr. STIEBELING. All of the work in food and about half of the work in clothing is directly related to agriculture, in that it consists of study of the relative utility of agricultural products, food and fiber for use in the home. Of course, the end use of most agricultural products is to provide the food, clothing, and shelter of people. Our task is to study the kind of food people need and to discover the contributions that different foods make to the diet. We give information to agriculture as to the kind and assortment of foods that are needed by our population.

Mr. ANDERSEN. In your work you cannot draw the line too carefully as to whether it will benefit just farm people. We want you to do everything you can for all Americans. But the bulk of your work, I would presume, is for the benefit, first of all, of the rural resident, is it not?

Dr. STIEBELING. Our work in housing, in household equipment, and our investigations of the economic problems of the home deal directly with rural families. The rest of the work is of just as much value to urban families as it is to rural families. It also helps find markets for agricultural production.

Mr. ANDERSEN. Mr. Whitten, do you have any questions up to this point?

NUMBER OF HOME ECONOMISTS

Mr. WHITTEN. I would like to have the number of home economists in the various counties throughout the United States and the approximate number of teachers of home economics in the various high schools and other schools of the Nation; the total number of people in that field of work who are relying upon the information which you accumulate and an approximation of what percentage of their source material is supplied either by the Bureau or based on findings of the Bureau.

I think it is a story that needs to be told, though all members of the committee are familiar with it, but it is information that I doubt the public generally fully appreciates.

ACCOMPLISHMENTS OF THE BUREAU

Dr. STIEBELING. I would like to show some charts which in part, but not wholly, answer your question, Mr. Whitten. In 1952, 5½ million copies of Bureau publications were distributed through the Government Printing Office. That, of course, represents only a portion of the publications of the Bureau, because, as I explained earlier, only about half of our publications are issued through the Government Printing Office. These publications are used by extension and other Govern-

ment services, by teachers and other educational and welfare groups, by industry and trade, by newspapers and magazines, and by radio and television people. They are sent to libraries and other groups on request.

Mr. WHITTEN. That means a whole lot to those who are familiar with this program, but there are others who know little about it. When you put the number of extension people and the number of these others with whom you work, it means so much more than the general title which, of course, you have in that chart.

Dr. STIEBELING. Yes, I agree with you. The Extension Service use our publications in reaching, according to their reports, 6½ million families. They reported last year in their annual report, that over 3 million families changed home practices as a result of their extension work in food preparation, food preservation, clothing, construction, consumer buying, improving kitchens, and selecting home furnishings and equipment.

Mr. ANDERSEN. That was just in the 1 year, 1951. I do not think you brought that out.

Dr. STIEBELING. That is correct, in 1 year, 1951. This was taken from the Extension Service's annual report. Other USDA channels for the use of our material, are the Farmers' Home Administration workers who reach about 200,000 farm families; REA workers, through the electrification cooperatives—chiefly on equipment—reached 3½ million families. And State and local nutrition committees, which are made up of the leaders in States and communities concerned with nutrition. Those leaders include the extension worker, the teacher, the public health nutritionist, the medical people, the social worker and representatives of other agencies including the food trade that have reason to use food and nutrition information.

Mr. ANDERSEN. I know, for example, Doctor, dietitians in hospitals make use of your work. I know that personally, because it happens that my sister is a dietitian at a large hospital.

Dr. STIEBELING. Yes, they make use of a great deal of our work.

4–H CLUB ACCOMPLISHMENTS

Mr. WHITTEN. Doctor Stiebeling, I have just returned from the 4–H Club breakfast downtown. Mr. Laird and Mr. Marshall were there and other members had planned to attend but had conflicts that made it impossible for them to be there this morning. It was marvelous to hear those young people explain the work that they have done in 4–H Clubs. Of course, I like to talk about having been a 4–H Club worker myself years ago. I would like, with the chairman's permission, to suggest that the names of those who participated in this program—the winners—and what they have done be included in our record as a shining example of what the work of the Department of Agriculture means to the young people of this country.

Among other statements made there was a voluntary statement by one of the young ladies on the program that she doubted that she would have had money to go to school or would not have been interested in this work, except for the information made available to her through the bulletins, leaflets, and other releases of the Department of Agriculture.

One of these winners had made in the last 12 years $24,000 net out of his projects in 4–H Club work. One of the young ladies had some 600 or 800 different items of work that she had done. One young man there—I believe I am correct in my figures—had been in the animal projects and now, though only 18 years old, he has 33 head of cows, which he has put out with 33 youngsters, so that they, in turn, can have a calf project. We worry about a lot of things, but we do not have to worry about communism with fine young people like that.

I think it would be well for our record to pay tribute to these people by putting the names of the winners and what they have done in this record.

Mr. ANDERSEN. I think your suggestion is very worthwhile. As long as 30 years ago I, personally, used to sell beef calves to 4–H Club boys. I think if there is one thing that has helped agriculture through the years, it is the 4–H Club program in all of its different phases. I personally regret that I was unable to be there this morning.

Dr. STIEBELING. I, too, was sorry not to be able to attend that breakfast, because each time I have attended, it has been a great inspiration to me, to learn of the accomplishments of that fine group.

(Information requested is as follows:)

HIGHLIGHTS OF THE 4–H CLUB RECORDS OF CAROLYN S. CRUMM, 18, ALFALFA, OKLA.; BILLY A. DAVIS, JR., 18, VALDOSTA, GA.; MARLENE C. HUTCHINSON, LINCOLN, NEBR.; WILLIAM FRANCIS PRESSLY, 20, STONY POINT, N. C.; ROLLIN SHOEMAKER, 18, DENVER, COLO.; ADRIAN SHORT, 18, CHIPLEY, GA.

Carolyn S. Crumm.—In her 10 4–H years she has completed 125 projects, from clothing to bees. Among them were 10 years each in health, clothing, home improvement, food preparation, food preservation, home beautification, electricity, and farm safety. Estimated income from all projects totals a very worth-while amount, and she says 4–H taught her thrift. She needed a typewriter, so plowed wheat stubble to earn it. One project was better grooming, and in this she was named national winner and given a trip to National 4–H Club Congress in 1951. The year before she had attended congress as national health winner. Other honors: 5 trips to the annual State 4–H roundup at Stillwater; 2 to State 4–H Club congress; 1 to State fair school, and 1 to the State home demonstration farm and home week where she represented 4–H on the health panel. The girl was especially proud of being named as honorary colonel on Governor Johnson Murray's staff, serving as his escort at the State congress citizenship program.

For 3 years Carolyn has served as president of her club, and of the county and the State 4–H organizations. An able speaker, she has made 242 talks on 4–H, taken part in 68 group discussions, written 96 stories, and has appeared on radio, television, and in films. Deeply appreciative of the help others have given her, she in turn has served younger members as junior leader for 6 years, her adult leader being Mrs. Jewel Patterson. This 4–H'er is very active in community affairs, helping with polio funds, Red Cross, and tuberculosis drives; and in church and school events she has organized over 160 musical programs. As winner of the national 4–H achievement awards program in 1952, she received a silver trophy, a college scholarship, and a trip to National 4–H Club Congress.

Billy A. Davis, Jr.—In his 8 years of 4–H, his leadership has encouraged farm youth of the community to share in 4–H and given force to the statewide drive for members. In 1951 he was a State citizenship winner and delegate to National 4–H Club camp in Washington, D. C., where he served as a member of the delegates' advisory committee and led citizenship discussions. He is president of his club, county vice president, and heads the State 4–H organization. He has shown masterly talents in his production projects on swine, poultry, dairy, garden, and corn, his cotton program earning a trip to the 1951 National 4–H Club Congress.

In 1950 he led the move for a county camp to serve 4–H and other youth groups, and in 14 months the camp was dedicated by the Lieutenant Governor, with

Billy presiding. In 1952 as State president he took over plans for a State 4–H center, speaking to some 5,000 members over the State. Contributions swelled to $85,000, construction began last January, and in August the Governor dedicated the first 3 cottages, with Billy presiding.

As winner of the national 4–H leadership awards program in 1952, he received a college scholarship, a silver trophy, and a trip to National 4–H Club Congress.

Marlene C. Hutchinson.—A 9-year 4–H Club member, Marlene has revealed leadership ability. She has led a health club of her own for 3 years, and last year organized a club of 8-to-10-year-olds. She assists her mother, Mrs. D. E. Hutchinson, in leading two clubs, supervising demonstrations, judging, record books, song groups, and health activities. As citizenship leader, she accompanied a group to Omaha, to visit the preprimary conventions. Marlene also was national winner in improved ironing and attended the 1951 National 4–H Club Congress in Chicago. She is now a student at the University of Nebraska. As runner-up winner of the 4–H leadership program, she also attended National 4–H Club Congress in 1952, and received a college scholarship.

William Francis Pressly.—Twelve years in 4–H, he credits the 4–H speaking contests for his ability to address an audience with ease. He has told the 4–H story and his concept of good citizenship to many and varied groups, including an appeal in 1950 to a State legislative committee in the name of farm organizations for funds to build a coliseum at the State fairgrounds in Raleigh. "We got the coliseum," he reports. In 1945, urging conservation in all its aspects, before Rotary, Kiwanis, and other organizations in his own and adjoining counties, he helped win the "master farm family award" for himself and his parents.

Young Pressly has served his club as president, vice president, and recreational leader; has been president and song leader of the 4–H county council; and vice president of the State council. He was chosen to address the national 4–H breakfast in Washington, D. C., which led to an invitation to address the convention of the national food council at Bretton Woods, N. H. As State champion of the farm and home electric and dairy production programs he attended two sessions of the National 4–H Club Congress.

He has completed 69 projects in 12 years and has won top State honors in rural electrification, public speaking, dairy production, leadership, citizenship, and achievement. He was alternate national winner in dairy production in 1946 and first-place national winner of a college scholarship in 1949.

He was named an International Farm Youth Exchange delegate in 1951, spending 4 months in Italy. At a meeting of about 350 people called by the farm manager, Pressly showed pictures of 4–H in the United States while the manager explained them.

After returning he spent 3 months in an international campaign, giving 57 talks, and making 3 coast-to-coast television appearances, 2 coast-to-coast broadcasts, and 10 State or local broadcasts. At the 1951 National 4–H Club Congress he told of his trip and appeared on television. Francis is now attending North Carolina State College. He is a member of the Scotts 4–H Club, with Oren Stout as leader.

As winner of the national 4–H citizenship program in 1952, he received a college scholarship and a trip to National 4–H Club Congress.

Rollin Shoemaker.—An 8-year 4–H Club member, he carried on soil conservation activities so effectively he won a trip to the 1951 National 4–H Club Congress. County Agent Robert Buck says Rollin "lives his 4–H work in every sense of the word. He and his partner carried the story of conservation to every junior and senior public high school in this district, as well as to many adult clubs and service organizations * * * reaching approximately 50,000 in 3 States."

His earliest project was a successful honey business in partnership with his brother, and then dairying. One winter the Shoemaker boys milked 60 cows, working from 3 a. m. to 9:30 p. m. They kept up school work, too. Disasters did not stop them. A flood washed out the bridge between house and barn, so they forded; their apiary was burned by careless workmen, destroying hundreds of dollars' worth of honey; and dogs destroyed many sheep. Rollin writes: "I found that each time we met with misfortune, we were catapulted into a new and better field."

In addition to conservation, honey, dairy, and sheep, the youth has made good with poultry, beef cattle, tractor maintenance, gardening, and rabbit raising. An especially capable junior leader, he set up a swine pool to help 33 boys and girls get into this program, and with a few lambs salvaged from his dog-ravaged flock, he assisted 4 boys to establish their own flocks. He has done the same with some purebred Holsteins. Now a student at Colorado A. and M., Rollin is still a member of the Aces of Spades 4–H Club led by his mother, Mrs. H. Shoemaker.

As winner of the national 4–H achievement award program in 1952, he received a silver trophy, a college scholarship, and a trip to National 4–H Club Congress.

Adrian Short.—She has a 9-year 4–H record filled with accomplishments in home-making projects, poultry raising, leadership and public speaking. She has addressed meetings of the farm bureau and chamber of commerce, Youth Rally Day, and leadership-recognition dinners. In 1950 as a State winner in bread baking, she appeared on television and was awarded a trip to National 4–H Club Congress.

As a community service, Adrian helped her club win first place in the county's community improvement drive, a clean-up campaign featuring health and safety. On her leadership record she attended "Girls' State," studying governmental methods by simulating elections and law-making services. In 1950, after high-school graduation as valedictorian, she attended the State 4–H council meeting and was awarded a $400 scholarship. That summer she was chosen Farm Bureau Queen of Harris County and represented the Bureau in the district contest. On entering Abraham-Baldwin Agricultural College she joined the college 4–H Club. As program manager, she arranged discussions on government concerned with the methods of electing the President, the armed power of the United States, and aspects of the atomic age.

At home she has been a member of the Chipley 4–H Club, Mrs. J. B. Short, leader. As winner of the national 4–H citizenship program, she received a college scholarship and a trip to National 4–H Club Congress in 1952.

NUMBER OF HOME ECONOMISTS

Dr. STIEBELING. You were asking about the number of home economists who make use of our research findings—excuse me for interrupting, but I did not want to overlook this—there are now 67,000 students and more than 2,500 home-economics-trained faculty members in 350 colleges and universities. There are 1¾ million high-school pupils studying under more than 22,000 State, county and city home economics supervisors and teachers; there are 9½ million children in 50,000 schools that are served through the school-lunch program. There are more than 2,500 home economists in business. There are more than 4,600 home economists in 4–H Club and other Extension Service programs in home economics, who reached 6½ million families in 1951. The American Home Economics Association has a membership of 20,000.

Mr. ANDERSEN. Through the Extension Service, I think you can honestly claim there are very few spots in the United States that the results of your research do not enter; is that correct?

DISSEMINATION OF BUREAU'S RESEARCH FINDINGS

Dr. STIEBELING. I think that is true. In addition, the press and radio and other means help to retell the findings that are carried in our publications.

For example, 2,000 newspaper syndicates and free-lance writers, 187 magazines, and various radio programs receive our materials. I think it is of interest the extent to which national magazines pick up and reproduce the materials which our Bureau publishes. For example, Good Housekeeping reproduced much of our bulletin on home freezers in one issue. The Country Gentleman has carried an article written by the Surgeon General of the United States Public Health Service, in which he makes use of our material, and credits the source of the material to our Bureau; Practical Home Economics, which goes to many teachers of home economics in the country has reproduced in one of its issues information that was presented at

the annual outlook conference, which is a joint effort of the Bureau of Agricultural Economics, the Extension Service and our Bureau. We attempt in the outlook conference to do for the home-management specialists of the Extension Service what the Bureau of Agricultural Economics does for the economists of that service, in bringing together information about the economic situation which affects the management decisions that families make. The Science News Letter, Progressive Farmer, the American Home, and Service—which is the magazine of the Culinary Association, published by Tuskegee Institute—all use material which we issue.

COOPERATION WITH PUBLIC HEALTH WORKERS

Mr. ANDERSEN. Doctor, do you collaborate in any way with the Public Health Service and conduct dietary studies at institutions such as we have out at Bethesda?

Dr. STIEBELING. We have informal cooperative work with the National Institutes of Health, particularly at the present time on studies of diet in relation to metabolic disturbances. Dr. Bragdon, a pathologist there, has been a consultant and we plan that he will be a joint author of our technical report. The cooperative work with the laboratory of physiological hygiene of the University of Minnesota is a three-way effort between the National Institutes of Health, the Minnesota institution, and our Bureau.

We keep in close touch with the work of the National Institutes of Health. The United States Public Health Service and the Department of Agriculture, together with an interagency committee on nutrition education and school lunch were the sponsors of a nutrition institute that was held here last fall. The purpose of this institute, attended by 400 leaders in nutrition and home economics, was to take stock of the country's nutritional progress, and to discuss ways of strengthening programs that are directed toward human nutrition betterment. We keep in touch with the public health group through monthly meetings of this interagency committee on nutritional education in school lunches. We invite them to special programs that we arrange in relation to nutrition and they invite us to theirs. So, there is a close working relationship between the two groups.

Mr. ANDERSEN. I am glad to hear that.

PROPOSED INCREASES

We have increases requested by this particular bureau before us of $151,298. I wish you would give a short résumé of what you expect to do with these increases, if granted.

STUDIES OF HUMAN NUTRITIONAL REQUIREMENTS

Dr. STIEBELING. About half is planned for use in increasing our knowledge of human nutritional requirements including the matter of the relation of nutrition to premature physical impairment. It is to intensify the work that we now have under way with the Univeristy of Minnesota and in our own laboratories. The increase would just about double the amount of work that we are now able to do and speed forward, we feel, the acquisition of important new knowledge.

The rest of the increase is concerned with the problem of reducing waste and using food effectively. I am sure that in presentations made by Dr. Shaw and others, the tremendous task of keeping food production in line with the needs of a rapidly growing population have been brought out. As a nutritionist, I would like to make two points: First, of course, we shall need more food and a proper assortment of food for health as our population increases. This does not mean more of everything in the same proportions that we have been using. With the increased proportion of elderly people in our population and with increased mechanization in this country, not only in industry, but on the farms, the calorie requirements of life have been lessened on a per capita basis, not in the aggregate, but on a per capita basis, whereas the need for minerals and vitamins, according to present knowledge, have been increased. From a health standpoint, probably there will need to be some shift in the proportions in which various kinds of food are produced. That is information that may come from research such as we are doing. We would not expect shifts in market demand to come rapidly, but we feel that if the Department and the farmers of the country, know the direction in which shifts are likely to occur with increased knowledge of nutrition, they will be in a better position to make adjustments.

In addition to a need for increased production of the needed assortment of food, there is need for reduction of waste at every point where it can be made. Every pound of food that is saved, means 1 less pound to be produced.

COLLABORATION WITH PMA IN MARKETING PROGRAMS

Mr. ANDERSEN. Doctor, in your studies, do you keep in mind the major problems facing the Department of Agriculture? I am thinking of the field of price supports, for example. We have had difficulties in two fields, meat and butter, as well as a few other products. Are your studies designed to help out in the solution of these difficulties?

Dr. STIEBELING. We give the Production and Marketing Administration all available information on the place of such items in the diet so they can use it in their marketing programs.

Mr. ANDERSEN. What I have in mind is the recent glut of meat which is forcing the price down on the market. If your organization could come out with some sort of a message to the consumer, urging the consumption of that particular product at a time when it was cheap, and informing the public as to how to utilize it, I think it would help.

Mr. WHITTEN. That would hardly be in line with a research unit, as against the extension department, the PMA or some organization in the operational end.

Mr. ANDERSEN. Perhaps, you are correct.

Mr. WHITTEN. As long as she gives them the information as to what use can be made of the surplus, someone else should promote it.

Dr. STIEBELING. We have been doing two specific things in our research and development work that have been geared to the problem you indicated. For example, when dried eggs and dried milk were very abundant and could be used by the school-lunch program effectively, we developed receipes for the use of that program. We also have a small project underway which was requested by an officer of

the Restaurant Association, namely, to develop new recipes for the use of institutions, public eating places, hospitals and others—large-quantity recipes—that will give ideas to food managers of new ways of using the products which are in abundance.

Mr. ANDERSEN. You mentioned in your opening statement, Doctor, that you do very little along the line of marketing research. I do think that this is a proper field for your organization. I do agree absolutely with Mr. Whitten that the results of your work must go through the extension service to reach the people.

STUDIES ON POTATOES

Mr. HORAN. Dr. Stiebeling, one of the things which was done in the Bureau of Plant Industry, was to study the problem of potatoes. I tried to make some of that information available to the restaurants in my district, because the evidence was very clear that the handling of potatoes would materially affect the edibility of the end product, whether it was french fries or chips. I wonder what steps you are taking to make such information continuously available to the people who need it most. I would like to know, also, whether or not there are any tests that one might use to determine the condition of potatoes.

I bought some from a huckster the other day and they were no good. Probably they got too cold, which will make them soggy.

Dr. STIEBELING. Yes, sir.

Mr. HORAN. Of course, good handlers will make sure that the temperatures are controlled.

Do you have any way of testing potatoes that you might find in the market?

Dr. STIEBELING. The Bureau of Plant Industry and our Bureau have been collaborating on the study of potatoes, those of different varieties, grown at different places, and held under different condition prior to the use in the home or public eating place. There are relatively simple chemical tests by which you can determine the extent to which the starch has been converted to sugar and hence causes the potato to brown too rapidly in the preparation of french-fried potatoes and potato chips. That test is simple enough to be used by anyone who is doing food preparation on a large scale, as in restaurants or hotels or large institutions. It is not very practical for the housewife. However, we have learned that potatoes often can be reconditioned by keeping them at room temperature for several days before using them, to help to reverse the process that takes place when potatoes get too chilled.

Another point that seems to be important is the specific gravity of potatoes in relation to the cooking purposes for which they are best suited. The Bureau of Plant Industry and our Bureau has been trying to get the facts in order to establish tests that might be applied in a simple way by large users of potatoes. Potatoes, of course, differ greatly in percentage of moisture with degree of maturity, and one thing which we are working on at the moment is the kind of preparation procedures that can be used with watery potatoes to get improved results. It is hard to develop specific tests but it is the ultimate objective that we have in mind. We are contemplating a manual on potatoes and potato cookery. The research has not been completed as yet, but after the preparation of that manual, which will be suitable

for the use of the more technically trained people, we hope to get out a bulletin in a series on facts for consumer education—one that will deal with potatoes.

Coming back to the question about our help with problems of gluts or surpluses, and referring to your question, Mr. Andersen, we have a unit with a small staff which is developing large-quantity recipes for use in restaurants and institutions. They consult with the Production and Marketing Administration as to what foods are likely to be in abundance 3 or 4 months ahead. Then we can gear our recipe development to those items and have a group of recipes ready for the abundant foods when the glut occurs.

Mr. ANDERSEN. I think that is very commendable, Doctor. I think you should look ahead on things of that nature. For instance, last August and September, we had to put into consumption through the school-lunch program a huge quantity of turkeys to bolster the turkey market. I presume you have done something on that.

Dr. STIEBELING. Yes, sir; we have a publication pertaining to school lunches.

CALCIUM AND MILK CONTENT OF BREAD

Mr. LAIRD. Mr. Chairman, these tests which are being carried on are well and good, but what practical use is made of them?

For instance, in the use of calcium, you can check the bread of different bakeries throughout the country and you will find that the amount of calcium varies on a ratio from "1 to 16." What recommendations do you make or do you just have your tests and that is the end of it? It is interesting information, but is it used?

Dr. STIEBELING. There are two points I might make in that connection. One result of the study on the calcium content of bread was to give us a better average figure for the many uses that people have for average figures on the composition of any food. We hope that eventually the labels on bread will tell how much milk or how much calcium the bread contains. At the present time the law merely requires declaration of the fact that milk solids have been used in the preparation of bread, but there is no information required as to how much. We hope from showing this wide variation, that bakers on their own, without compulsory requirement, will eventually give the information to consumers and we can choose the kind we would like to have.

Mr. LAIRD. Do you try to get this information out to the consumers so that the consumers know if the bread contains the necessary and proper ingredients?

Dr. STIEBELING. We got the information on calcium in bread to teachers and leaders through a technical publication and a press release. We have no publication on the subject specifically for the homemaker. We work chiefly through the educational organizations of the country. This is the first time that information was available on the wide variation of calcium in bread. One of the interesting things that came out is that the same brand of bread bought in different parts of the country may contain different amounts of milk and of calcium. So unless people who are interested will ask the manufacturer or processor to give the information, there is no way of handling it.

Mr. LAIRD. Of course, they will not ask that question unless your information gets out that you obtain from your tests to the public?

Dr. STIEBELING. We try to get our information to the public through all the channels we have, but we are not primarily a teaching agency; we put the facts at the disposal of teachers, extension workers, social workers, food editors, and others interested.

Mr. LAIRD. Right now there is a temporary surplus in milk production. Diet studies of the people of this country show a deficiency in calcium. Milk is the source of calcium. What recommendations are you making?

Dr. STIEBELING. American diets contain less calcium in relation to present knowledge of how much people need than they do of almost any other nutrient.

Mr. LAIRD. It is one of the elements in which diets tend to be short.

Dr. STIEBELING. I think we are the biggest boosters for milk in all forms.

Mr. LAIRD. I wanted to bring this out so far as bread was concerned.

Dr. STIEBELING. Breads can be important carriers of milk solids and calcium from other sources, too.

Mr. MARSHALL. Dr. Stiebeling, I have been interested in your excellent presentation this morning.

Dr. STIEBELING. Thank you, sir.

FAMILY FOOD EXPENDITURES AS RELATED TO INCOME

Mr. MARSHALL. There were some comments made a moment ago about finding a market for farm products, which leads me to ask a question.

Do you have any figures on the consumption of food products, based upon the income of families. To be a little more specific, let's use the example of a family that has an income of three to four thousand dollars a year. How does the amount spent for food by that family compare with one with a higher income, say from $5,000 to $6,000? Do you have figures on that?

Dr. STIEBELING. Yes; we do, sir. In 1948 to 1950 we made rather extensive studies of food consumption of urban families in different parts of the country, and classified results by income and size of family. Information on the percentage of income used for food and the quality of diets in relation thereto as compared with present nutritional knowledge, is set forth in a number of processed publications. We put the facts out in processed form first to get them to the public promptly. We are now summarizing the data in a printed publication so as to have it all in one place. I will be glad to furnish information on that.

Mr. MARSHALL. I wonder, Mr. Chairman, if we might have submitted for the record a very brief statement to show how the amount spent for food is related to income.

Mr. ANDERSEN. That is a very worthwhile suggestion, Mr. Marshall and we will have that done at this point.

Mr. MARSHALL. In addition to that, they may have some brief statement showing the amounts spent for food as income increases in the family.

Dr. STIEBELING. We do, sir.

(The information requested is as follows:)

Families with higher incomes spent more dollars for food than those with lower incomes, but a smaller proportion of their incomes. This is true in both urban and rural areas.

A Bureau survey of food consumption of urban families in the spring of 1948 showed that the food expenditures of all families averaged $25.57 a week or about one-third (32 percent) of their incomes. The figures for families in selected low-, middle-, and high-income classes are as follows:

Income class	Food expenditures in a week	Percent of income spent for food
$1,000 to $1,999	$17.12	45
$3,000 to $3,999	27.06	35
$5,000 to $7,499	31.36	24

Expenditures for food by farm families depend to a large extent upon the amounts of food they raise for home use. For example, in a study of families in the South, it was found that a group in a cotton area producing relatively little food for home use, spent 35 percent of their cash income for food. Those in a mountain area, where the average estimated money value of home-produced food was over twice that in the cotton area, spent only 23 percent of their cash incomes for food. In each of these type-of-farming areas, the families with higher incomes spent more dollars for food than those with lower incomes, but the proportion of money income spent for food was smaller for those with the higher incomes. This is illustrated by figures for the year 1947 for families in two income classes:

Income class	Expenditures for food in a—			
	Cotton-growing area		Mountain area	
	Dollars	Percent of income	Dollars	Percent of income
$500 to $999	399	54	320	43
$2,000 to $2,999	696	28	465	18

Although there have been some changes in incomes and consumer prices since 1947–48, these relationships probably have not changed much.

INFORMATION TO INDIAN BUREAU

Mr. MARSHALL. Does the Indian Bureau make any use of your information?

Dr. STIEBELING. The home economists of the Indian Service are on a mailing list to get our publications. They must adapt the information to the particular problems which they face. I cannot be specific as to how they use it, but they do have our material.

COLLABORATION WITH DEPARTMENTAL ADVISORY COMMITTEES

Mr. MARSHALL. Doctor Stiebeling, could you inform us as to how you collaborate with the advisory committees that are established?

Dr. STIEBELING. For each progress report prepared for advisory committees, their meetings with the Department to advise and make recommendations regarding research, we prepare a summary of our progress during the past year. The publications issued, and the problems that we see ahead in relation to the specific commodity, or in the case of food and nutrition, the overall progress on national

nutrition problems. Our material thus is combined with that of other research agencies of the Department. When the committees meet here, representatives of our Bureau are present to answer any questions which the advisory committee may wish to raise regarding our program. Then, the recommendations made by the committee regarding work that falls within our authorization are taken into consideration in our evaluation of current programs and in plans for future work.

CONTRACT RESEARCH

Mr. MARSHALL. Dr. Stiebeling, could you inform us as to how many projects you have out under contract and what those projects consist of?

Dr. STIEBELING. Yes, sir. Each year by means of contract arrangements, we have undertaken for us by qualified research groups in the States, research relative to different phases of the utilization of agricultural products for food or fabric. At the present time most of our contracts deal with human nutritional requirements or with the nutritive values of food. In the States, the experiment stations and other groups have access to people willing to serve as human subjects in a way that we do not here. We have contracts for research to determine the requirements of children, of college students and of elderly people for different amino acids, for certain vitamins, and also to determine the extent to which people can use ascobic acid from different foods. Contracts for research on that subject are going on simultaneously in three parts of the country.

Mr. ANDERSEN. Dr. Stiebeling, I wish you would furnish for the record at this point tables showing in detail just what work you do under contract, with whom you do it, and the approximate amount of funds involved.

Dr. STIEBELING. We can do that readily. May I ask, do you wish the report for last year, or for each year from the beginning of our authority to contract research?

Mr. MARSHALL. I would think this last year and what they contemplate in the next fiscal year would be sufficient.

Mr. ANDERSEN. All right, let us have it for fiscal years 1953 and 1954.

(The information requested is as follows:)

The following information refers to contracts negotiated in fiscal year 1952 and negotiated or pending in 1953. It is impossible to list specific proposals for 1954 at the present time inasmuch as these are dependent on the outcome of current work. We anticipate, however, that the 1954 contracts will be similar in nature to those negotiated in 1952 and 1953. We expect to use a total of about $90,000 for contracts in 1954.

Fiscal year 1952

Objective of contract	Contractor	Amount
Amino-acid requirements: Determine minimal requirements of young women for threonine, valine, tryptophan.	University of Nebraska, Lincoln, Nebr.	$24,000
For phenylalanine, leucine, and all 5 simultaneously	do	27,600
Energy requirements: Measure energy expenditures of women 20–30, and 50–60 years of age at comparable tasks.	Teachers College, Columbia University, New York, N. Y.	16,000
Food consumption of families: Collect data on foods used by 1,200 rural households in north-central region.	Iowa State College, Ames, Iowa.	50,000
Food and nutrition research in progress in United States of America, 1953: Collect and classify titles of research under way, source of funds and names of research leaders.	National Academy of Sciences, Washington, D. C.	8,000

Fiscal year 1953 (negotiated or pending)

Food consumption of families: Tabulate and make statistical analysis of data on diets of rural families (collected under 1952 contract).	Iowa State College, Ames, Iowa.	$16,000
Food consumption in institutions: Collect data on food issued, losses, and nutrient content of diets in 4 institutions.	Arthur D. Little, Cambridge, Mass.	21,800
Survey of mode of selected foods by 300 urban families	National Analysts, Inc., Philadelphia, Pa.	8,325
Composition of foods: Nutrients in foods from islands of South Pacific.	University of Hawaii, Honolulu, T. H.	3,500
Fiber content of selected foods from islands of South Pacific	do	1,500
Pantothenic-acid content of selected foods	Texas Agricultural Experiment Station, College Station, Tex.	5,000
Human requirements: Amino-acid requirements of older women	University of Wisconsin, Madison, Wis.	30,000

URBAN POPULATION BENEFITS FROM BUREAU'S RESEARCH

Mr. MARSHALL. All through our work with the Agriculture appropriation, we talk in terms of what the Agriculture Department programs mean for farming and we sometimes give the impression, I think, that we are making this appropriation for about 15 percent of our total population. From my observation this is entirely incorrect, because I have observed that people living in the urban centers, particularly, make use of the information that they get from the Bureau of Home Economics. While it is within your authority to render your service for farm people, you have no control over who uses the information after you supply it, and it is my observation that presently a far greater percent of the population makes use of your information that do not reside on farms.

Mr. ANDERSEN. Mr. Marshall, you are absolutely correct. I am sure that can be stated generally in relation to all agricultural research, but the work of this particular bureau extends almost into every part of our society.

Mr. MARSHALL. I have never been in a home, in a city or in the country, that some phase of your work has not reached it in some way or another. To that extent, that is how widespread it is, but the impression that is often left is that we are appropriating these huge sums of money for farm people.

Dr. STIEBELING. Yes, sir.

Mr. MARSHALL. Demands are made on the Extension Service for work that you have done in research and oftentimes our farm families are badly neglected in not being able to obtain these services.

Mr. WHITTEN. Mr. Marshall, could I interrupt for one comment? You heard this statement a few minutes ago and it made quite an impression on me, having worked with this program. A young man at the 4–H Club breakfast was asked by some young lady if he had been active in trying to point out the need for soil-conservation work and he said he had spoken to approximately 50,000 people in some brief period. And the question was asked whether it was primarily to rural people and he said "No, to everyone, because all of us must realize if we are going to starve, we will all starve together." The work you do is of benefit to all concerned, whether you are directly on the farm or in the cities.

Dr. STIEBELING. We have felt that because the marketing of agricultural products is primarily in the cities that we must reach the city people, through teachers, as well as the farm people through the extension service.

Mr. ANDERSEN. Doctor, we have felt through the years that your work is very worthwhile. That is why this subcommittee has been as generous as it has with your program.

Any questions, Mr. Hunter?

Mr. HUNTER. I do not believe I have any questions.

INCREASED FUNDS FOR RESEARCH

Mr. ANDERSEN. Now as to a few specific questions before we finish, Doctor, You perhaps did not give a full answer to my question relative to the increased request for $151,000. Now if you care to extend your remarks on that, you may do so.

Dr. STIEBELING. I would be glad to do that.

(Additional statement is as follows:)

REDUCTION OF WASTE, AND IMPROVEMENT OF NUTRITIVE VALUE

The food bill of families in this country amounts to more than $50 billion a year. Current statistics suggest that the food brought into the Nation's kitchens provides about 20 percent more calories than is needed to sustain life and work. Hence, an accusing finger of inordinate waste is being leveled at the housewife.

Some of the waste occurring in the home may, of course, stem from poor food quality. It may be that damage in the marketing system causes more food loss in the kitchen than has heretofore been estimated. And it may be that some food as marketed is less well suited to the needs and wants of consumers than it should be. How much of the calorie loss in the household, for example, is due to waste of fat that comes with certain cuts of meat—fat unwanted in the kitchen or at the table?

Regardless of cause, any avoidable waste of food is a problem needing attention. But to suggest effective measures for reducing it, we must know more about its nature, cause, and extent. Specifically, we need more facts on the edible yield, quality, nutritive value, and the physical losses associated with commodities as commonly purchased—especially meats, vegetables, and fruits. Data now available are fragmentary.

To provide information that can help families reduce the physical and invisible nutritive losses in home-stored food, we also plan to undertake research basic to procedures for using refrigeration facilities more effectively. Farm families have problems of maintaining quality in their stored food not met in commercial refrigerated storage, where products requiring different temperature or humidity can be kept separately.

Also to improve the quality of the food of the future, we need more information on the influence of production and processing practices on nutritive values and table quality. The original nutritive values of food are known to be influenced by many environmental factors in their production, such as soil characteristics, amount of sunlight and rate of growth of plants and animals. The products of different varieties and strains of the same plant or animal may not have the same values. The original values also are modified by conditions of storage and processing, both commercial and in the home. As a basis for improved production and processing practices, we need more information on the nutritional quality of food products grown and handled under known and controlled conditions. Our Bureau, as the Government agency responsible for food composition tables, should be able to cooperate more extensively with the United States Plant, Soil and Nutrition Laboratory and other USDA agencies in getting such data. To this end we would use part of the increase requested in the 1954 budget.

PERSONNEL INCREASES

Mr. ANDERSEN. Under that increase, how many persons do you propose to add?

Dr. STIEBELING. Twenty-nine, sir.

Mr. ANDERSEN. What will be their function?

Dr. STIEBELING. There will be two kinds of teams. One team will be made up of physiologists, histologists, chemists, and laboratory assistants.

For extending the studies of ways and means of reducing food waste and increasing the nutritive value of food as eaten, we shall use a team of food specialists, home economists, and chemists.

Mr. ANDERSEN. Now why cannot the work be performed with your present staff? Why cannot you put aside something you have been working on for a good many years and shift to this specific line of endeavor which you evidently consider very necessary?

Dr. STIEBELING. We have already directed into research on diet in relation to health all of our staff who are competent to do such work. What we are asking here is an acceleration or an expansion of what we are able to do with the present staff.

Mr. ANDERSEN. I think you told the committee previously that you were operating today with 100 less people than in 1950.

Where were most of those 100 people engaged?

Dr. STIEBELING. Across the board.

Mr. ANDERSEN. They were eliminated because of the lack of sufficient appropriations to keep them on?

Dr. STIEBELING. That is right.

Mr. ANDERSEN. Of course, in your executive capacity as administrator of the Bureau, it is up to you to say what are needed and what are not. I am not quite satisfied with your answer to my previous question. Do we not have old work going on—this same question has come up often in this subcommittee as far as it relates to research—do we not have a lot of old work that you are performing year after year, which should be set aside for a year or two in favor of something new?

Dr. STIEBELING. As a matter of fact, Mr. Chairman, with the reductions in staff which we have made over the last 4 years, we have progressively reevaluated our work and already have discontinued the less profitable and less important parts of it.

Practically all of the research which is going on at the present time is research which has been initiated within the last several years, new phases of work. We do not have under way work that has been going on indefinitely, year after year.

Mr. ANDERSEN. You know, candidly, I think that is one benefit which follows when this subcommittee or when the Congress decides to reduce your appropriations as we did in 1950. That is one benefit that accrues to you whether you know it or not. It forces you to analyze your programs. You have to reevaluate all of these programs in order to get along with the lesser appropriation. Of course, we do not want to limit you too closely, but I think some reduction is beneficial. Do you agree to a certain extent there?

Dr. STIEBELING. I think the program we have left is a hard core of research and that there is no fat, no water, in it.

Mr. ANDERSEN. Now, Doctor, is this new work of lower priority than the work you are now doing? I have reference to this work you propose to do under the increase.

Dr. STIEBELING. We would complete the work that we are now doing, before we would undertake the specific researches for which we have asked increases. If we do not receive an increase to work on

these problems, we regard them of such high priority that we shall undertake them as soon as we complete phases of research that are now under way.

RATIO OF ADMINISTRATIVE PERSONNEL

Mr. ANDERSEN. Doctor, in conclusion, I wish you would describe the function of the 22 positions of the Administrative Division. How can you justify using better than 8 percent of your personnel for that particular work?

Dr. STIEBELING. I would like Miss Huneke, who is head of that Division, to answer your question.

Miss HUNEKE. Our Division is organized in several sections: the Budget and Fiscal Section, which has the responsibility for preparing the budget and for keeping the records of accounts and allotments; the Administrative Services Section, which takes care of procurement items, including the management of property, storage, utilization; the Communications and Records Section, which carries the files, and the messenger service, including the incoming and outgoing mail; and the Personnel Section, which has charge of the classification work, employment, recruitment, employee relations, training, and safety functions.

Then we have a small liaison office at Beltsville, Md., which takes care of the day-to-day needs of the laboratory.

Mr. ANDERSEN. You feel then that the 22 positions are absolutely justified, that they cannot be cut?

Miss HUNEKE. Yes, sir, we have already cut them quite extensively.

Mr. ANDERSEN. Still 8 percent is quite high, is it not, compared with other Bureaus?

Miss HUNEKE. Part of the administrative work really could be charged to program, in that we serve all of the research divisions. Our percentage compares favorably with other bureaus having a similar type of organization and function.

ANALYSIS OF ECONOMIST POSITIONS

Mr. ANDERSEN. Now, Dr. Stiebeling, I notice that you have 20 economists in your organization.

I wish you would place in the record a list of the positions and a statement as to what they do.

Dr. STIEBELING. Yes, sir.

(The information requested is as follows:)

Most of the 20 persons in our organization whose titles include the word "economist" are home economists who have had major training in the general field of nutrition and home economics, with additional training or experience in one or more sciences, such as chemistry, physics, physiology, economics, or statistics. The application of these sciences is essential to research on the relative utility and economy of agricultural products for food, clothing and other uses in the home, or to conduct economic investigations as have for their purpose the improvement of the rural home.

Only 4 of those classified as home economists in the Bureau can be considered primarily as economists or statisticians, and of those listed as home economists or food economists, at least 4 have no training or experience as economists. For example, two of the home economists listed are the assistant chiefs of the Bureau, who with specialized training and experience in textile chemistry and nutritional

science, respectively, share in the responsibility of directing the Bureau's entire research program. Another is a specialist in household textiles, investigating problems of the relative economy of different fabrics for home furnishing.

The other staff members titled home economists are in the Family Economics Division, engaged in research dealing with (1) the amount and nutritional adequacy of foods consumed by different groups in the population; (2) the food combinations that will give good nutrition at different cost levels; (3) the buying and budgeting problems of farm families; and (4) the measurement of agricultural products consumed by families, and analyses of factors affecting consumption. This program requires the joint efforts of staff with training in nutrition, food, and clothing technology, statistics and economics. Some of our work contributes to the work of economists, but a large share of it deals with problems of home management, which are not usually the concern of economists.

The grades of these positions are as follows:

GS–15, home economist (Assistant Chief)	2
GS–14, home economist (Head, Family Economics Division)	1
GS–13, home economist	3
GS–12, food economist	2
GS–12, home economist	2
GS–11, family economist	2
GS–11, food economist	1
GS–11, home economist	1
GS–9, family economist	2
GS–9, food economist	3
GS–9, home economist	1
Total	20

Mr. ANDERSEN. The committee appreciates your very fine statement here this morning.

Dr. STIEBELING. Thank you, sir.

Mr. ANDERSEN. Unless you have any further comments, we will conclude the hearing.

BUREAU OF ANIMAL INDUSTRY

WITNESSES

DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION
DR. B. T. SIMMS, CHIEF, BUREAU OF ANIMAL INDUSTRY
DR. HUGH C. McPHEE, ASSISTANT CHIEF, BUREAU OF ANIMAL INDUSTRY
DR. A. R. MILLER, ASSISTANT CHIEF, BUREAU OF ANIMAL INDUSTRY, AND CHIEF MEAT INSPECTION DIVISION
DR. T. C. BYERLY, CHIEF, ANIMAL HUSBANDRY DIVISION, BUREAU OF ANIMAL INDUSTRY
K. A. BUTLER, ASSISTANT CHIEF, BUREAU OF ANIMAL INDUSTRY
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

Salaries and Expenses

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$25,467,928	$26,391,462	$27,575,000
Transferred from—			
"Salaries and expenses, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration," pursuant to 5 U. S. C. 568b	7,000		
"Salaries and expenses, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration," plant, soil, and agricultural engineering research, pursuant to 5 U. S. C. 568b	10,000		
"Salaries and expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration," insect investigations, pursuant to 5 U. S. C. 568b	8,000		
"Salaries and expenses, Office of Administrator, Agricultural Research Administration," pursuant to 5 U. S. C. 568b	3,000		
Transferred to "Eradication of foot-and-mouth and other contagious diseases of animals and poultry, Agricultural Research Administration," pursuant to Public Law 451		−190,000	
Adjusted appropriation or estimate	25,495,928	26,201,462	27,575,000
Reimbursements from non-Federal sources	2,928,738	2,683,800	2,721,300
Reimbursements from other accounts	372,913	503,405	503,405
Total available for obligation	28,797,579	29,388,667	30,799,705
Unobligated balance, estimated savings	−107,303		
Obligations incurred	28,690,276	29,388,667	30,799,705
Comparative transfer from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	79,000	76,000	
Total obligations	28,769,276	29,464,667	30,799,705

NOTE.—Reimbursements from non-Federal sources above are from meat-packing and veterinary biological establishments and importers for overtime work and travel performed (5 U. S. C. 576; 7 U. S. C. 394, 396) and from proceeds of sale of personal property (40 U. S. C. 481 (c)). In the fiscal year 1952, receipts from meat packers for expenses of meat inspection in excess of those which could be met from amounts appropriated (Department of Agriculture Appropriation Act, 1952) are included.

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Animal research:			
(a) Animal husbandry	$2,186,294	$2,194,352	$2,372,700
(b) Infectious and noninfectious diseases of animals	954,364	1,135,758	1,400,758
(c) Parasites and parasitic diseases of animals	506,745	501,542	586,542
Subtotal	3,647,403	3,831,652	4,360,000
2. Animal disease control and eradication:			
(a) Eradicating tuberculosis and brucellosis	6,074,577	5,959,030	6,149,030
(b) Eradicating scabies	163,408	173,200	208,200
(c) Eradicating cattle ticks	316,078	289,250	383,440
(d) Control of hog cholera and related swine diseases	13,911	32,940	32,940
(e) Determining the existence of diseases in the field	21,204	90,440	130,440
(f) Import-export inspection and quarantine	349,053	366,390	746,390
(g) Supervision over interstate movement of livestock	590,640	866,620	866,620
(h) Control of manufacture, importation, shipment and marketing of viruses, serums, toxins, etc	503,329	507,940	537,940
Subtotal	8,032,200	8,285,810	9,055,000
3. Meat inspection:			
(a) Meat inspection operations at packing plants under the Federal meat inspection service	13,515,047	13,865,700	13,865,700
(b) Determination of adulterations and other objectionable conditions in meat and meat food products by laboratory analysis	174,168	189,800	189,800
(c) Inspection of imported meats and meat food products	67,206	70,500	70,500
(d) Bacteriological, pathological, and zoological determinations relating to meat inspection	31,601	34,000	34,000
Subtotal	13,788,022	14,160,000	14,160,000
4. Obligations under reimbursements from non-Federal sources	2,928,738	2,683,800	2,721,300
Total direct obligations	28,396,363	28,961,262	30,296,300
Obligations Payable Out of Reimbursements From Other Accounts			
1. Animal research:			
(a) Animal husbandry	31,336	103,905	103,905
(b) Infectious and noninfectious diseases of animals	34,574	50,000	50,000
(c) Parasites and parasitic diseases of animals	352	500	500
Subtotal	66,262	154,405	154,405
2. Animal disease control and eradication:			
(h) Control of manufacture, importation, shipment, and marketing of viruses, serums, toxins, etc	4,151	----------	----------
3. Meat inspection:			
(a) Meat inspection operations at packing plants under the Federal meat inspection service	302,500	349,000	349,000
Total obligations payable out of reimbursements from other accounts	372,913	503,405	503,405
Total obligations	28,769,276	29,464,667	30,799,705

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	5,268	5,218	5,391
Full-time equivalent of all other positions	134	81	86
Average number of all employees	4,986	5,047	5,223
Average salaries and grades:			
General schedule grades:			
Average salary	$4,522	$4,569	$4,567
Average grade	GS–6.4	GS–6.4	GS–6.4
Personal service obligations:			
Permanent positions	$22,060,198	$22,829,411	$23,539,523
Part-time and temporary positions	419,993	428,512	476,912
Regular pay in excess of 52-week base	87,372	91,304	93,184
Payment above basic rates	2,277,734	2,254,200	2,258,700
Payments to other agencies for reimbursable details	900	1,200	1,200
Total personal service obligations	24,846,197	25,604,627	26,369,519

Obligations by objects—Continued

Object classification	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
01 Personal services	$24,506,377	$25,146,867	$25,911,759
02 Travel	632,834	692,000	729,000
03 Transportation of things	90,927	97,000	97,100
04 Communication services	68,905	72,000	72,100
05 Rents and utility services	112,522	118,000	118,000
06 Printing and reproduction	108,351	110,000	110,000
07 Other contractual services	434,105	368,000	469,000
Services performed by other agencies	250,867	265,400	265,400
08 Supplies and materials	812,500	870,138	976,495
09 Equipment	164,245	202,400	348,150
10 Lands and structures	5,960	5,000	5,000
13 Refunds, awards, and indemnities:			
Tuberculosis indemnities	252,637	250,000	230,000
Brucellosis indemnities	940,950	750,000	950,000
Federal tort claims	136		
Awards for employee suggestions	885	2,000	2,000
15 Taxes and assessments	27,968	29,000	29,000
Subtotal	28,410,169	28,977,805	30,313,004
Deduct charges for quarters and subsistence	13,806	16,543	16,704
Total direct obligations	28,396,363	28,961,262	30,296,300
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	339,820	457,760	457,760
02 Travel	13,283	13,800	13,800
03 Transportation of things	1,563	1,600	1,600
04 Communication services	7	25	25
05 Rents and utility services	817	800	800
06 Printing and reproduction		100	100
07 Other contractual services	2,448	2,800	2,800
08 Supplies and materials	14,597	22,170	22,170
09 Equipment	359	4,000	4,000
15 Taxes and assessments	19	350	350
Total obligations payable out of reimbursements from other accounts	372,913	503,405	503,405
Total obligations	28,769,276	29,464,667	30,799,705

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$2,285,300	$2,345,532	$2,360,194
Obligations incurred during the year	28,690,276	29,388,667	30,799,705
	30,975,576	31,734,199	33,159,899
Deduct:			
Reimbursable obligations	3,301,651	3,187,205	3,224,705
Unliquidated obligations, end of year	2,345,532	2,360,194	2,500,194
Adjustment in obligations of prior years	298,311		
Obligated balance carried to certified claims account	14,102		
Total expenditures	25,015,980	26,186,800	27,435,000
Expenditures are distributed as follows:			
Out of current authorizations	23,088,585	23,841,300	25,074,800
Out of prior authorizations	1,927,395	2,345,500	2,360,200

Mr. ANDERSEN. The committee will come to order, gentlemen.

We are glad to have before us at this time Dr. Simms, Chief of the Bureau of Animal Industry, and his associates.

Prior to your general statement, Doctor, we will insert pages 121, 122, 126 through 129, and 143 through 185 of the justifications in the record.

(The material referred to is as follows:)

Purpose Statement

The Bureau of Animal Industry, established by the act of May 29, 1884, conducts research and administers a program primarily concerned with the protection and development of the livestock, meat, poultry, and related industries.

1. Research includes: (*a*) Experiments on the improvement of livestock (except dairy cattle), poultry, and domestic fur animals, together with studies of methods of improving the quality and usefulness of their products.

(*b*) Investigations of diseases and parasites affecting all classes of livestock, poultry, and domestic fur animals.

2. Protective measures include: (*a*) Inspection of animals and poultry at ports of entry, together with inspection and supervision of animal products or materials permitted entry under restrictions, in order to exclude diseases of foreign origin, particularly such dangerous diseases as foot-and-mouth disease and rinderpest, and examination for purposes of identification of purebred animals offered for entry free of duty.

(*b*) Inspection of livestock offered for export and of facilities on transporting vessels to assure humane handling and safe transport of animals.

(*c*) Control of interstate movement of livestock to detect and prevent the spread of communicable diseases, including inspection of all animals received at the larger stockyards; and administration of the 28-hour law which is designed to prevent cruelty to animals in interstate transportation.

(*d*) Supervision of the preparation of veterinary biological products to assure their purity and potency, and administration of a marketing agreement and order designed to maintain adequate supplies of hog cholera virus and anti-hog-cholera serum.

(*e*) Control and eradication of diseases in the field, such as tuberculosis, brucellosis, cattle tick fever, cattle and sheep scabies, hog cholera and related swine diseases, dourine of horses, etc., and of such diseases as foot-and-mouth disease, European fowl pest, etc., when such diseases occur in the United States. In addition, emergency programs for control and eradication of animal diseases are conducted when necessary, such as those carried on in 1953 for eradication of vesicular exanthema of swine and scrapie of sheep.

(*f*) Federal meat inspection under the Meat Inspection Act, the Horse Meat Act, and the Imported Meat Act, and regulations promulgated thereunder having for their purpose the production of a clean and wholesome meat supply for human consumption.

(*g*) Cooperation with Mexico in the prevention of foot-and-mouth disease there, as well as inspection and quarantine activities along the Mexican and Canadian borders to provide minimum protective measures to the livestock industry of the United States.

(*h*) Inspection and certification of canned animal foods upon application of manufacturers, financed by fees covered into the Treasury.

The Bureau maintains a central office in Washington, D. C., but most of its work is conducted in the field. Its stations, substations, and laboratories are located in 457 cities and towns in the United States and Territories, and at 46 cooperating agricultural experiment stations. Work is also conducted in the field in Mexico and at 3 European research laboratories. Plans for special facilities on Plum Island, N. Y., for research on foot-and-mouth and other diseases are now being prepared. Employees are engaged in work on farms, ranches, ports of entry into the United States, meatpacking establishments, public stockyards, establishments licensed under the Virus Serum Toxin Act, etc. On November 30, 1952, there were 5,297 full-time employees, of whom 374 were in Washington and the remainder in the field; and 215 part-time employees who work intermittently in the field.

Appropriated funds:

Appropriated, 1953	$26,797,462
Budget estimate, 1954	[1] 27,575,000

[1] In addition, the 1954 budget proposes the cancellation of notes in the amount of $7,057,575 to reimburse Commodity Credit Corporation for funds advanced and expenses incurred in fiscal year 1952 for control and eradication of foot-and-mouth disease.

Salaries and expenses

	Animal research	Animal disease control and eradication	Meat inspection	Total
Appropriation Act, 1953	$3,756,000	$8,477,000	$14,160,000	$26,393,000
Reductions pursuant to:				
Sec. 411	−348			−348
Sec. 412		−1,190		−1,190
Activities transferred in 1954 estimates from:				
"Salaries and expenses, Office of Administrator, Agricultural Research Administration" for services at the agricultural research center	+76,000			+76,000
"Eradication of foot-and-mouth and other contagious diseases of animals and poultry"		+330,000		+330,000
Base for 1954	3,831,652	8,805,810	14,160,000	26,797,462
Budget estimate, 1954	4,360,000	9,055,000	14,160,000	27,575,000
Increase	+528,348	+249,190		+777,538

Summary of increases, 1954

Animal research:	
For development of better methods of utilization of forage by livestock	+$293,348
For research on diseases of poultry and swine	+235,000
Animal disease control and eradication:	
To intensify program of scabies eradication in Louisiana and Mississippi	+35,000
To strengthen program for control and eradication of cattle fever ticks in quarantined area along international border in Texas	+94,190
For strengthened inspection service at sea and airports of entry to guard against introduction of foreign diseases such as foot-and-mouth disease and rinderpest	+90,000
For supervision of the production of modified live-virus hog-cholera vaccines	+30,000

Project statement

Project	1952	1953 estimate	Increase	1954 estimate
1. Animal research:				
(a) Animal husbandry	$2,186,294	$2,194,352	+$178,348	$2,372,700
(1) Swine-husbandry investigations	(397,682)	(396,031)		(396,031)
(2) Sheep- and goat-husbandry investigations	(358,229)	(359,928)	(+51,848)	(411,776)
(3) Horse- and mule-husbandry investigations	(5,086)	(4,856)		(4,856)
(4) Beef-cattle husbandry investigations	(482,070)	(492,660)	(+88,000)	(580,660)
(5) Dual-purpose cattle-husbandry investigations	(116,432)	(110,492)	(+29,500)	(139,992)
(6) Poultry-husbandry investigations	(729,405)	(734,000)	(+4,500)	(738,500)
(7) Fur-animal-husbandry investigations	(97,390)	(96,385)	(+4,500)	(100,885)
(b) Infectious and noninfectious diseases of animals	1,098,357	1,135,758	+265,000	1,400,758
(1) Cattle	(514,555)	(515,655)	(+40,000)	(555,655)
(2) Swine	(182,067)	(322,066)	(+65,000)	(387,066)
(3) Sheep and goats	(46,054)	(34,644)		(34,644)
(4) Horses	(21,755)	(10,448)		(10,448)
(5) Poultry	(293,571)	(215,118)	(+160,000)	(375,118)
(6) Fur animals	(40,355)	(37,827)		(37,827)
(c) Parasites and parasitic diseases of animals	506,745	501,542	+85,000	586,542
(1) Cattle	(130,083)	(140,742)	(+37,600)	(178,342)
(2) Swine	(61,032)	(64,600)	(+27,400)	(92,000)
(3) Sheep and goats	(77,991)	(74,700)	(+20,000)	(94,700)
(4) Poultry	(36,344)	(36,000)		(36,000)

Project statement—Continued

Project	1952	1953 estimate	Increase	1954 estimate
1. Animal research—Continued				
(c) Parasites and parasitic diseases of animals—Continued				
(5) Fur animals	($15,550)	($17,000)		($17,000)
(6) Treatments	(124,280)	(124,000)		(124,000)
(7) Miscellaneous parasite investigations	(61,465)	(44,500)		(44,500)
Subtotal	3,791,396	3,831,652	+$528,348	4,360,000
2. Animal-disease control and eradication:				
(a) Eradicating tuberculosis and brucellosis	6,074,577	[1] 6,149,030		6,149,030
(b) Eradicating scabies	163,408	173,200	+35,000	208,200
(c) Eradicating cattle ticks	316,078	289,250	+94,190	383,440
(d) Control of hog cholera and related swine diseases	13,911	32,940		32,940
(e) Determining the existence of diseases in the field	166,610	130,440		130,440
(f) Import-export inspection and quarantine	639,053	656,390	+90,000	746,390
(g) Supervision over interstate movement of livestock	868,329	866,620		866,620
(h) Control of manufacture, importation, shipment, and marketing of viruses, serums, toxins, etc	503,329	507,940	+30,000	537,940
Subtotal	8,745,295	[1] 8,805,810	+249,190	9,055,000
3. Meat inspection:				
(a) Meat-inspection operations at packing plants under the Federal meat-inspection service	13,515,047	13,865,700		13,865,700
(b) Determination of adulterations and other objectionable conditions in meat and meat food products by laboratory analysis	174,168	189,800		189,800
(c) Inspection of imported meats and meat food products	67,206	70,500		70,500
(d) Bacteriological, pathological, and zoological determinations relating to meat inspection	31,601	34,000		34,000
Subtotal	13,788,022	14,160,000		14,160,000
Total obligations	26,324,713	[1] 26,797,462	+777,538	27,575,000
Unobligated balance	107,303			
Total available or estimate	26,432,016	26,797,462	+777,538	27,575,000
Transfer in 1954 estimates from—				
"Salaries and expenses, Office of Administrator, Agricultural Research Administration"	−79,000	−76,000		
"Eradication of foot-and-mouth and other contagious diseases of animals and poultry"	−857,088	−330,000		
Transferred from—				
"Salaries and expenses, Bureau of Agricultural and Industrial Chemistry"	−7,000			
"Salaries and expenses, Bureau of Plant Industry, Soils, and Agricultural Engineering"	−10,000			
"Salaries and expenses, Bureau of Entomology and Plant Quarantine"	−8,000			
"Salaries and expenses, Office of Administrator, Agricultural Research Administration"	−3,000			
Reductions pursuant to secs. 411 and 412		+1,538		
Total appropriation or estimate	25,467,928	26,393,000		

[1] Includes $190,000 transferred in fiscal year 1953 to "Eradication of foot-and-mouth and other contagious diseases of animals and poultry" pursuant to authority contained in the Department of Agriculture Appropriation Act, 1953, under the latter appropriation. This transfer was made to finance emergency programs to eradicate vesicular exanthema of swine and scarpie of sheep. The funds transferred have been used principally for payment of indemnities.

In addition, due to the emergency caused by the outbreaks of these diseases, personnel under "Salaries and expenses (animal-disease control and eradication)" are detailed in 1953 to the emergency program as their services are needed.

STATUS OF PROGRAM

Animal Research

ANIMAL HUSBANDRY INVESTIGATIONS

Current activities include research directed toward more efficient breeding, feeding, and management of poultry, fur animals, and all livestock, except dairy cattle. Activities also include research on factors affecting the production of high quality products and their processing and preservation.

With the present rate of population increase, approximately 350 million pounds more meat, exclusive of poultry, must be produced each year if present per capita rate of consumption is to be maintained. Because of the limitations of available land and feed supplies for future expansion, a major portion of the increase must come from the development of more productive and efficient strains of animals, more efficient feeding practices, and better management. The research program is designed to accomplish this objective by raising the reproductive level of farm animals, increasing the growth rate, making the most efficient use of available feed supplies, and managing the livestock to obtain maximum production of quality products.

There were on American farms, January 1, 1952, approximately 88 million cattle, 64 million hogs, 32 million sheep, 453 million chickens, 1,500,000 fur-bearing animals, 6 million horses and mules, and 4 million rabbits. Even a slight improvement in reproduction efficiency, rate of gain, and feed utilization efficiency means millions of pounds more animal products and savings of large quantities of feed for the country as a whole.

Examples of recent progress

(1) *Beltsville swine lines combine well with American pure breeds.*—The Beltsville swine lines selectively bred for meat type and other economic traits from crosses of Danish Landrace with certain other swine breeds, have been tested for crossing value with Berkshires, Poland China, Hampshire, and Chester White breeds at Beltsville and, cooperatively, on Pennsylvania farms. The Beltsville data indicate that such crosses are vigorous, viable, efficient, and fast-gaining. While rapid growth is often associated with fatness in swine, the Beltsville line-purebred crosses were slightly meatier than their purebred parents and generally a good meat type. More than 90 percent of test pigs of pure Beltsville line breeding at Beltsville in 1951 live graded U. S. Choice No. 1, about 70 percent of the test pigs of the four pure breeds graded U. S. Choice No. 1, while about 75 percent of the line-bred cross pigs were U. S. Choice No. 1.

(2) *Boars from certain inbred lines produce superior top-cross progeny.*—In cooperation with the regional swine breeding laboratory program, the Wisconsin Agricultural Experiment Station conducted trials with inbred boars of 8 lines on 44 Wisconsin farms during the last year. Performance of gilts sired by inbred boars of selected lines and produced on farms has been compared with that of gilts by noninbred boars and out of similar sows. Gilts by the inbred boars excelled the others by about one pig per litter at weaning. Inbred lines varied widely with respect to top-cross progeny performance. Average performance exceeded noninbreds. However, this was due to outstanding performance of progenies from certain lines. Others failed to equal performance of progenies from noninbred boars. Clearly there must be selection among inbred lines based on progeny performance tests in order to determine what ones can be used profitably by swine producers.

(3) *Superior meat-type lines produce fast-gaining, meat-type progenies when crossed.*—Carcass studies demonstrate that when inbred lines which produce superior carcasses themselves are crossed, superior carcasses are produced by the line-cross pigs. These results have been obtained consistently even when the growth rate of the crosses is rapid, many litters attaining weights of 215 to 225 pounds at less than 140 days of age. This result is of particular interest because some of the studies have indicated a positive association between rate of gain and fatness of carcass.

(4) *Aureomycin, alfalfa leaf meal, and high protein improve swine breeding diets.*—Research at Beltsville has demonstrated that inclusion of 15 percent of dehydrated alfalfa meal and 10 milligrams per pound aureomycin in corn-soybean meal-mineral diets for sows during gestation sharply increased percentages of pigs weaned and weaning weights of pigs. Diets containing protein of both animal and vegetable origin gave much better results when they contained 20 percent

protein than when 15 percent protein level was used since approximately one more pig per litter was weaned. However, an addition of an antibiotic vitamin B_{12} supplement providing 6 milligrams of aureomycin per pound of diet to the 15 percent protein diet raised the average number of pigs weaned per litter to approximately that of the 20 percent protein diet, namely 8.33 pigs.

(5) *Nutritional qualities of cottonseed meals improved by changes in processing and by proper supplementation.*—Nutritional studies on cottonseed meals processed under conditions which remove most of the toxic compound, gossypol, and which limit the temperatures and pressures to which the cottonseed is subjected in extration of the oil continue to show that such meals are of considerably higher nutritive value than ordinary meals generally available for use. The gossypol content is so reduced that as much as 30 percent of meal in a swine diet has not produced any toxic symptoms. It has been found, too, that increased levels of calcium, phosphorus, and vitamin D over those generally recognized as adequate are necessary in swine diets to overcome interferences from some compound, possibly phytic acid, in the cottonseed meal included in the diets.

(6) *Compounds responsible for rancid flavor in cured and frozen pork identified.*—Development of rancid flavor is a serious limitation on the quality of farm, locker plant, and industrially cured and frozen pork. While fresh pork frozen and stored at −90° F. develops little rancidity, loins frozen for 12 months at 0° F. rated only fair because of rancidity. Rancidity in bacon is proportional to time stored and salt concentration in the sides. Research during the past year at Beltsville has identified certain chemical compounds classed as volatile carbonyls as responsible for the rancid flavors. This work will aid in the estimation of rancidity and may lead to methods for delaying development of rancidity.

(7) *Heritability of fineness of breech wool determined.*—Coarseness of breech wool seriously impairs the value of many fleeces. Breech wool is generally coarser than that on other body areas to a variable extent. Preliminary estimates of heritability of breech wool scores were obtained on 2,103 weanling lambs born in 1950 at Dubois, Idaho. It appears that the uniformity of fleeces may be difficult to improve by selection, but that the fineness of the fleece may be changed more readily. High genetic correlations may exist between the fineness of side and of breech wool which prevent or deter improvement of fleece conformity.

(8) *Wide seasonal variations in composition of forage species in spring-fall Idaho sheep range.*—Chemical composition of grasses, forbs, and shrubs from the upper Snake River Plain was determined in cooperation with the University of Idaho. During the spring grazing season the high protein, phosphorus, and fat content of wheat grass and balsam root and the low proportion of crude fiber indicate that ranges supporting these and other grasses and shrubs supply a good diet for sheep. In the fall, however, the same forage is but a poor roughage, low in protein, phosphorus, and fat and higher in crude fiber. The presence of shrubs on these ranges helps to correct these fall deficiencies. Even the relatively unpalatable sagebrush is utilized to some extent, especially in late fall.

(9) *Southdown-Hampshire cross lambs excel in quality and growth rate.*—Southdown sires mated to Hampshire ewes produced 75-pound lambs of Choice grade in 200 days. Lambs from this cross were equal in excellence and earlier in reaching slaughter weight than any of the other five breeds and 10 crosses tested in 1951 at Beltsville. The average weight of slaughter lamb produced per ewe per day was 0.47. This Southdown × Hampshire cross has consistently showed early development and excellent fattening qualities over a period of 4 years and it has never ranked below second place in the crosses tested.

(10) *Analysis of worsted card yields of yearling Targhee ram and ewe wool matchings indicates considerable variability.*—The search for individual Targhee yearling sheep possessing superior wool type has led to analysis of worsted carding data of matchings from 95 yearling Targhee rams and 157 yearling Targhee ewes of the United States Sheep Experiment Station, Dubois, Idaho. Concerning this variability, the range in percent yield on clean scoured conditioned basis was found to be as follows:

For yearling Targhee rams:
- 64's and finer, 80 to 90 percent.
- 60/62's, 82 to 94 percent.
- 56/58's, 84 to 91 percent.

For yearling Targhee ewes:
- 64's and finer, 84 to 93 percent.
- 60/62's, 85 to 94 percent.
- 56/58's, 87 to 94 percent.

This clearly indicates that there are individuals possessing superior wool for worsted carding. Individual sheep possessing superior wool must be identified for use in breeding programs. This wool carding research, together with wool combing and fabric making research, is necessary in order to accomplish this wool improvement.

(11) *Significant variations in yield of wool tops from individual fleeces are revealed by combing research.*—Study of the results obtained from the French comb presents an opportunity for identifying individual sheep with respect to their capacity for producing wool that will yield relatively high percentage of tops. Tests run on the comb with fine wool show that the repeatability of the machine is reliable, producing tops and noils in the ratio of 10:1 in repeated tests on Rambouillet wool. Up to the present time, individual Targhee fleeces of fine wool have been combed with a yield of tops to noils varying from 12:1 to 8:1. This wool combing research is essential for identifying and selecting breeding sheep that are capable of producing wool of greatest usefulness for fabric manufacture.

(12) *Examination of foetal stages of karakul sheep reveal that 90 to 100 days is period of greatest development of hair follicles.*—However, microscopic examinations indicate that cell division activity in the skin is very great just prior to and during the stage just preceding this development and that this rate of activity declines during the subsequent growth periods A series of slides representing a range of foetal, young, and mature stages have been prepared for the sheep, rabbit, and mouse and are being used for the study of changes in skin thickness, fiber population, fiber diameter, and pigmentation. Information regarding the early development of fibers is basic to the understanding of these structures and useful in surveying the characteristics of the older stages for purposes of planned improvement of animals and their fibers through breeding, feeding, and management.

(13) *Beef sires genetically transmit superior feedlot performance.*—Rate of feedlot gain grossly affects both feedlot profit and tonnage of beef produced. Selective breeding research by the Bureau and 37 cooperating agricultural experiment stations is evaluating more than 100 lines of beef cattle with respect to feedlot performance and other inherited traits of economic importance. In cooperation with Montana Agricultural Experiment Station at Miles City, Mont., performance tests with sire groups of steers gave average daily gains of 2.31 to 2.66 pounds per day. Hereford line 1, which has been maintained as a closed herd since 1936, continues to show improvement in ability to make rapid gains. Cooperation with the Texas Agricultural Experiment Station at the McGregor and Balmorhea substations showed that selection based on performance test data is an effective method for increasing rate of gain. The 2 highest gaining bull calves in the 1948–49 Balmorhea performance test sired 5 calves of which 3 were in the top 25 percent of all calves tested at McGregor in 1950–51. Fast and slow gaining bulls' progeny tested at the Virginia Agricultural Experiment Station at Blacksburg yielded data which indicated heritabilities of 41 to 53 percent for rate of gain.

(14) *Cattle select grass of high nutritive value.*—Pasture utilization studies at Beltsville during the summer of 1951 involving various grass mixtures and fertilization levels showed surprising uniformity in phosphorus and protein content throughout the grazing season when the pasturage was maintained at about the same coverage or state of growth. The samples were taken to simulate that eaten by the grazing cattle. When pasture coverage varied, the protein content reflected the differences, being highest when new short growth occurred and lowest with heavier coverage. Lightly grazed pastures, unless clipped, accumulate areas of old, unpalatable forage which is largely wasted. Such forage is low in both protein and phosphorus.

(15) *Calves unharmed by long periods of caloric restriction.*—Previous reports for identical twin pairs (1 member restricted from 6 months to 12 months of age), indicated that caloric restriction alone does not add to total feed cost to bring cattle to 1,000 pounds body weight nor does it adversely affect carcass or meat quality at that weight. Extension of these studies to younger calves (restricted from 3 months to 6 months of age, including some calves receiving only three-eighths of the generous allowance fed their twins), indicates that the restricted calves survive in good health and gain rapidly when again placed on generous feed allowance. These studies will be of great practical value to cattlemen who must purchase winter feed. They may restrict energy intake sharply if they provide adequate protein, vitamin A and mineral intake.

(16) *Factors affecting deterioration in color of packaged meat determined.*—Research conducted under contract with the New Jersey Agricultural Experiment Station on prepackaged retail cuts of fresh meat has demonstrated that deteriorative color changes are accelerated by storage temperatures above 34° F., presence

of ascorbic acid, low oxygen tension, high percentage of fat, and high counts of achromobacter. These findings will guide further studies to find packaging materials and holding conditions which will minimize deteriorative color changes.

(17) *Fat enhances eating quality of bologna within limits of accepted trade usage.*—Within the limits of fat and lean proportion accepted by the trade as good sausage making practice, data obtained at Beltsville indicate that fat content is positively correlated with juiciness and tenderness of bologna. Moisture and fat are partially interchangeable in affecting tenderness and juiciness. Based on these results an important improvement in the utilization of animal fats seems possible.

(18) *Dual-purpose type Shorthorn steers reach choice grade at 1,300 pounds.*—Performance testing of dual-purpose type Shorthorn steers has previously ended at slaughter weight of 900 pounds. At this weight, the steers varied from low good to high choice in grade and from 51 to 66 percent in dressing percentage. An exploratory experiment at Beltsville carried 10 steers to choice grade which they reached at a slaughter weight of about 1,300 pounds. At this weight and grade dressing percentage was about 60 percent which may be compared with the 60 percent found for 112 beef Shorthorn steers at approximately 900 pounds slaughter and at the same finish as the 1,300 pound dual-purpose steers.

(19) *Selected hybrids excel in egg production.*—Hybrid chickens, the progeny of inbred lines developed at cooperating State and Federal experiment stations, are under test at the Central Testing Station at Lafayette, Ind., in comparison with selected standardbreds, crossbreds, and commercial hybrids. Several of the experiment stations' hybrid combinations, generally combinations of lines of different breeds, are giving superior egg production, approaching that of the commercial hybrids under tests. A hybrid combination of Beltsville Leghorn line 65 x Beltsville single comb Rhode Island Red line 44 is among the better group. This combination has consistently given superior results at Beltsville and limited amounts of stock of these lines will be made available to breeders for further testing.

(20) *Egg production of Beltsville small white turkey increased by selective breeding.*—Individual and family selection of Beltsville small whites for egg production was terminated in fall of 1951, having accomplished an increase from 88 eggs in 1945 to 158 eggs in 1951. The Beltsville small white is the foundation of the new and growing turkey broiler industry because of its long season of egg production as well as its characteristic good hatch ability and small size. It is estimated that more than 10,000,000 turkey broilers will be produced during calendar year 1952.

(21) *Bloodspots in eggs mechanically detected.*—Basic research at Beltsville in cooperation with the Farm Electrification Division of the Bureau of Plant Industry, Soils, and Agricultural Engineering, on the spectral properties of eggs, has led to the development of a mechanical device which detects the presence of blood in white shelled eggs with high accuracy. It has failed to indicate blood in such eggs only when the diameter of the blood spot is less than ⅛ inch, an accuracy higher than is attainable with present candling methods.

(22) *Injection of amino acid (tryptophan) causes increase in vitamin (niacin) content of chick embryo.*—Basic research on embryo metabolism at Beltsville demonstrated that the chick embryo is able to use the amino acid tryptophan to make the essential vitamin niacin. Apparently the embryo both builds and uses niacin. Injecting niacin into the incubating egg had no sparing effect on tryptophan. During the normal course of incubation the tryptophan content of the egg decreases and the niacin content of the embryo increases. While research results have enabled hatcherymen to improve hatchability about 5 percent in the past 10 years, we still lose about 2,000 carloads of eggs annually through embryonic mortality. Elimination of this waste depends on more information on the physiology of embryonic development.

(23) *Barbiturates augment hormonal induction of ovulation in chickens.*—It has been determined that cyclic environmental factors induce hormonal release from the pituitary gland accounting for the daily egg production characteristic of laying hens in peak production. Control of this mechanism may be possible when all of the intermediate physiological steps are known so that the rate of egg production may be controlled, within the limits of the hen's capacity to transform feed into eggs. As a step in this control process it has been demonstrated at Beltsville that subovulatory doses of the hormone progesterone, previously shown to cause release of the ovulation-inducing hormone by the pituitary gland when injected in adequate dosage, may be augmented by simultaneous injection of barbiturates. This augmenting action of barbiturates demonstrates for the first time the existence of a nervous mechanism effective in pituitary release of ovulation-inducing hormone since barbiturates are known to act on the nervous system.

(24) *Yolk color affected by hereditary factors.*—Yolk color is a factor of considerable importance both to the direct consumer who desires uniformity and the baker who desires deep pigmentation Much of the variation in yolk color is known to be due to variations in pigment content of feed. Among birds receiving the same diet, variation in yolk color is in part due to hereditary differences among hens. This has been demonstrated by a selective breeding experiment at Beltsville which has established lines of chickens, the eggs from one of which generally have yolk color twice as dark as those of the line selected for pale yolks.

(25) *Viruslike agent causes lymphomatosis (range paralysis) in chicks.*—Lymphomatosis is the major cause of mortality in laying hens, causing losses to farmers of many millions of dollars annually. This tumorous disease may be limited by breeding genetically resistant stocks and use of management methods to prevent spread among young chickens, but until diagnostic methods efficient in identifying affected chickens without clinical symptoms can be developed the disease cannot be eliminated. A major step toward diagnosis has been accomplished in the demonstration of a viruslike filterable agent as the cause of the disease. This agent has been demonstrated by inoculation experiments not only in tumors and blood of chickens grossly affected by the disease but in the tissues of certain embryos from normal-appearing parents as well. This latter fact establishes egg transmission of the disease, as well as showing the existence of carrier hens, which are apparently healthy.

(26) The status of work under the national poultry and turkey improvement plans is shown in the following table:

Item	1950	1951	1952
National poultry-improvement plan:			
States	47	47	47
Hatcheries	4,637	4,482	4,389
Egg capacity of hatcheries	367,253,150	383,642,943	389,716,303
Hatchery-supply flocks	106,597	95,079	96,089
Birds in hatchery-supply flocks	34,700,337	33,719,373	37,473,625
Average percentage of reactors to pullorum tests (first test)	.72	.54	.38
U. S. R. O. P. (United States record of performance) breeders	266	246	221
U. S. R. O. P. flocks	365	333	304
Birds entered in trap nest flocks	194,085	180,092	(1)
U. S. R. O. P. breeding pens	4,411	4,530	(1)
Females in U. S. R. O. P. breeding pens	68,829	70,733	(1)
Meat production performance test entrants		9	15
National turkey-improvement plan:			
States	46	46	47
Hatcheries	815	895	819
Flocks	3,922	3,920	4,273
Birds	2,132,644	2,264,369	3,063,677
U. S. R. O. P. flocks	58	47	51
Single tom matings	628	650	565
Candidates trapped	7,757	7,320	6,637
Average percentage of reactors to pullorum test (first test)	.39	.36	.21

[1] Information not available at time of reporting.

(27) *Death losses in young rabbits reduced by feeding an antibiotic supplement.*—The incorporation of 5 pounds of an aureomycin-containing fermentation by-product per ton of rabbit feed has reduced cases of enteritis among the litters of young rabbits by about 83 percent, or a reduction from 8.4 to 1.5 percent. The aureomycin supplied by the supplement amounted to approximately 5 milligrams per pound of feed. Doubling the level of supplementation failed to show any increased benefit. The antibiotic supplement was ineffective in control of pneumonia. The beneficial effect on enteritis is an important item, however, since it means that 1 additional 4-pound fryer rabbit will be reared for every 2 litters of young rabbits.

(28) *Both antibiotics and vitamin E have beneficial effects on health and growth of young mink.*—Experiments at Petersburg, Alaska, in cooperation with the Alaska Experiment Station were directed at means of reducing losses from various causes including a serious disorder known as watery hide disease. The diets in use contain a large proportion of fish or fish waste, and the more oily materials are considered as the more troublesome in development of watery hides. The result showed that the antibiotic aureomycin markedly reduced death losses and improved growth rates, while the vitamin E compound alpha-tocopherol appeared

to have a specific effect in reducing cases of watery hide even on diets high in oily fish waste. These benefits signify that higher quality pelts can be produced with the basic feed supplies at hand.

INVESTIGATIONS OF INFECTIOUS AND NONINFECTIOUS DISEASES OF DOMESTIC ANIMALS

Work in progress is directed toward diagnosis, cause, prevention, treatment, and control of communicable diseases caused by bacteria, fungi, and viruses, such as brucellosis, tuberculosis, mastitis, hog cholera, swine erysipelas, fowl typhoid, and Newcastle and pullorum disease of poultry; noninfectious diseases and pathological conditions caused by metabolic disturbances, tumors, unhygenic practices, etc., and stock poisoning by plants. Beginning with fiscal year 1953, research on foot-and-mouth disease in Europe is carried on under this appropriation. This research is contributing to the control of diseases of livestock and thereby improving efficiency of production.

Infectious and noninfectious diseases are responsible for annual losses of about $575 million to livestock and poultry producers in this country. In addition, considerable losses have already been experienced in fiscal year 1953 from extensive outbreaks of vesicular exanthema in swine.

Examples of recent progress

(1) Research on the classification of Brucella-free and -infected cattle has shown that the serum and whey agglutination tests and the whole milk ring and plate tests were all highly efficient. All tests gave 98.5 to 100 percent positive or suspicious reactions in infected cattle shedding *Br. abortus*. Serum agglutination test was generally positive or suspicious in cattle that had ceased to shed Brucella, but the whey agglutination test was negative in 99.2 percent of the milk samples. All adult vaccinated cattle were classified as reactors or suspects by the serum agglutination test; 89.7 percent of their milk samples were negative by the whey agglutination test; and 50 percent were positive by the milk ring and plate tests. Of cattle vaccinated as calves 25.8 percent had serum agglutinin titers as high as 1:25; 98.9 percent were negative to whey agglutination test.

(2) The toxic agent concerned in the production of X-disease has been found to be present in a variety of com pounds to which cattle have access. At least some of the specific chemical compounds have been identified as causing the disease.

(3) Bacteriologic investigations carried out cooperatively with commercial beef and dairy herds where sterility was a serious problem revealed *Vibrio fetus* to be an important causative agent. The successful isolation of this micro-organism was due largely to the use of a special instrument which enabled the operator to obtain uncontaminated specimens from the vagina and uterus and the application of special media. Information is accumulating in the United States and several European countries to indicate *Vibrio fetus* may be a widespread infection responsible for a venereal disease causing reproductive trouble.

(4) Low protein level in ration interferes with reproduction in beef cows: After 1 year's work in a long-time reproduction study on protein requirements, beef-type cows show a decided tendency toward slow breeding when fed on a diet calculated to contain only 5 percent digestible protein (8 percent crude protein) in contrast to improved performance on 10 percent of digestible protein. Of 9 cows on the 5-percent level, only 4 have calved in comparison to 8 out of 9 that have calved in the 10-percent group. None of the calves have been lost in either group. Those born in the high-protein group weighed about 20 percent more at birth than those in the low-protein group.

(5) Cooperative research liaison has been maintained with foreign foot-and-mouth disease research stations. However, the serious and widespread epizootic of the disease in Western Europe has greatly increased demand for vaccine and has slowed the research program materially, especially in Denmark and the Netherlands. It was necessary to terminate a comprehensive comparative test of vaccine before significant results were obtained. Meanwhile, however, the Research Institute at Pirbright, England, completed a substantial test of the products, and the report is in the press.

(6) Progress has been made at Pirbright in the biophysical studies of the viruses of foot-and-mouth disease and vesicular stomatitis. Foot-and-mouth disease virus suspensions have been found to contain two kinds of particles of different size, the larger one being the infectious particle, the smaller being the fraction that functions as antigen in the complement-fixation test for identification of viruses of different types. A report on similar studies of vesicular stomatitis virus is being prepared.

(7) The pilot plant for so-called tissue culture of foot-and-mouth disease virus at Amsterdam has been placed in operation, and practically all vaccine is now being prepared with such virus. Additional laboratory space has been provided at the laboratory on Lindholm Island, Denmark, for tissue culture of virus. The vaccine continues to be produced with virus from inoculated cattle, but the aim is to change to culture virus as rapidly as possible.

(8) It has been found at the Pirbright laboratory that unweaned white mice may be very useful for propagation and identification of the viruses of foot-and-mouth disease. In contrast with guinea pigs, it has been found that most strains of virus are equally infective for adult cattle and unweaned mice.

(9) The cooperating laboratory at Pirbright has continued to supply type-specific foot-and-mouth disease antiserum for use in the diagnostic laboratory and confirmed the identity of the virus that appeared in the August 1951 outbreak in the State of Vera Cruz, Mexico, as type A.

(10) Studies on the variant hog-cholera virus have continued through attempts to stabilize the variant characteristics through animal passages with and without immune serum and also attempts to produce potent vaccines and potent antiserums from variant virus. Recommendations made last year—that in vaccinating pigs the serum and virus should be used before weaning and that the dose of serum should be increased at least 25 percent over the previously recommended dose—have been practiced to a considerable extent, and reported postvaccination troubles have been at a minimum in the past year.

(11) Two new types of hog-cholera vaccine have been introduced by commercial firms in the past year, both being strains of hog-cholera virus which have been passed through rabbits, the so-called lapinized virus. Difficulties have at times followed the use of these products in the field, and as they occur these troubles are being investigated.

(12) Some of the biological establishments are taking additional steps to safeguard the hog cholera virus against inclusion of the variant. These steps are based on the finding of the Bureau that virus can be held without deterioration at −40° F. for a year or more. The long holding period not only permits a longer expiration dating but also permits testing to insure absence of variant virus which was not economically feasible under the former expiration dating of 90 days.

(13) Brucellosis has been shown to occur in about 20 percent of pigs that sucked infected dams. A higher incidence of brucellosis occurred in pigs sucking sows with acute and subacute infection than in those sucking sows with chronic brucellosis. Contrary to previous evidence, it has been demonstrated that latent infection does occur in pigs that sucked infected sows, although the pigs were negative to the agglutination test during the suckling and immediate postweaning periods.

(14) In studies of swine erysipelas, it was found that by means of the percutaneous skin-scarification method of exposure, swine erysipelas with its systemic and cutaneous manifestations can be consistently induced in susceptible swine. This has eliminated one of the biggest obstacles to a more thorough study of the disease itself, as well as permitting more accurate means of evaluating biological preparations for its control.

(15) Vaccination of turkey poults with serum and a turkey-virulent strain of the erysipelas organisma shows definite evidence of providing a highly desirable immunity up to market age.

(16) Cooperative research agreements on "air-sac" infection in poultry have been affected and given intensive support in the agricultural experiment stations of the States of Connecticut, Delaware, Georgia, Massachusetts, Maryland, North Carolina, and Virginia.

(17) Extensive laboratory studies with experimental lots of crystalviolet inactivated Newcastle disease vaccine showed that this product is an effective immunizing agent against the disease. However, its chief shortcoming is that the immunity thus produced is not of sufficient duration to be popularly received in the field by the poultry growers. Efforts will be continued to develop a product of this type which will produce an immunity of practical duration.

(18) In studies of pullorum disease in poultry, it was found that exposure of susceptible strains of *S. pullorum* to bacteriophage (the filtrable agent of bacteria) increases their sensitivity when they are used in the production of stained antigens, but specific bacteriophage explained above was not correlated with the serologic type of the pullorum organism. In a survey of the antigenic properties of several hundred *S. pullorum* cultures, several strains of the standard type and several of the variant type have been selected as having desirable antigenic

properties and promise to serve as useful strains for routine pullorum-antigen production.

(19) An antigen for the detection of carriers of fowl cholera by the rapid, whole blood, plate-agglutination test has been developed that gives promise of considerable usefulness in the control of this disease.

(20) The fowl-cholera organism, Pasteurella multocida, was found to persist for at least 2 years in 2 flocks recovered from natural outbreaks. In making cultures to determine this point, there was found a variant of the regular Pasteurella multocida organism which is designated as a maltose positive variant. The role of the variant in starting new outbreaks of fowl cholera is now being studied.

(21) In investigations of the diseases of fur animals, a neutralization test was developed for the study of distemper in the mink, fox, and dog. A technique was adapted for use with egg-adapted distemper virus using the developing chick embryo as the test animal. The test was applied to a large number of serum samples collected from mink at various periods following vaccination or following exposure to infected ferrets. The approximate time of appearance of circulating neutralizing antibodies and the relative titres at various times thereafter were thus determined.

(22) Results of an experiment to evaluate egg-adapted distemper virus as a vaccine showed that it is incapable of causing severe distemper in the most susceptible host (ferret) and is capable of quickly inducing resistance to a virulent distemper virus.

(23) The distemper virus was found present in the nasal fluids of mink before clinical signs of the disease were observed. Similarly, virus may be present in infectious quantities following the disappearance of catarrhal signs. The distemper virus was demonstrated in the conjunctival exudate and the skin "scurf" of infected mink and was isolated from mink-handling mitts following the handling of infected mink. The virus could not be demonstrated in the feces or urine of experimentally infected mink nor in flies trapped on ranches that had on their premises many infected mink.

(24) Studies to determine the harmful effects, if any, of insecticides when used on animals included tests with Geigy 2208, a new compound, on young dairy calves and adult Angora goats. Both species were killed by 0.25 percent emulsions applied as sprays and dips, the first symptoms being noted in as little as 6 minutes and death occurring within 12 minutes after application of the material to the skin. Both species were intoxicated by 0.1 percent concentration of the material but recovered in a matter of minutes. The symptoms of poisoning by this compound are typical of those produced generally by cholinesterase-inhibiting drugs, such as lentin, physostigmine. The antidote is atropine.

(25) Direct application of emulsions and suspensions of most of the chlorinated hydrocarbon insecticides to chickens was found hazardous. Symptoms and lesions of poisoning in chickens were found to be similar to those observed in other animals.

(26) A number of components of EQ–335 screwworm treatment were studied for possible irritancy on the skins of treated animals. Many were found to be severely irritating and their producers were so informed. In most instances at least one product from each company was found satisfactory for use in the formula.

(27) Radioactive iodine 131 was used as a label on a certain insecticide to gain knowledge of its disposition within the body. The liver, lungs, and spleen were found to be the first to take up the insecticide. After several days, usually less than a week, the insecticide was found to be almost entirely within the fat deposits of the body of the animal to which it was administered. When injected intravenously the compound disappeared rapidly from the circulation of sheep, the level becoming practically zero within 5 minutes.

INVESTIGATIONS OF PARASITES AND PARASITIC DISEASES OF DOMESTIC ANIMALS

Current research includes work to develop methods of coping with internal and external parasites and the diseases they cause, such as coccidiosis of livestock and poultry, trichinosis of swine, stomach, intestinal, and lungworms of farm animals, liver flukes of ruminants, cattle grubs, and mange mites of livestock. Parasites are estimated conservatively to cause an annual loss in excess of $300 million. This research is contributing to the control of parasites and parasitic diseases and thereby improving the efficiency of livestock production.

30505—63—pt. 2——19

Examples of recent progress

(1) Trichomoniasis in bulls, a parasitic disease transmissible to cows and heifers by breeding, was more readily diagnosed in the laboratory when samples were obtained by the douche method than by the pipette or swab methods. When diagnosis had to be made on the farm, where the douche method could not be applied, the pipette method of obtaining the sample was found to be more accurate than the swab method. By obtaining samples from bulls in several herds, those found to be infected were isolated for treatment before they could pass on the infection to cows and heifers.

(2) Stomach worms and nodular worms in calves were kept in check by making available to these animals a mineral mixture medicated with phenothiazine. The self-medication apparently reduced the pasture contamination, because even traces of phenothiazine in the droppings can kill parasite eggs.

(3) Yearling cattle on temporary pastures harbored fewer parasites and gained more weight than those on permanent pastures. The animals on a fescule-white clover pasture had the highest parasite load and made the poorest gains. Also, the cattle that were given a supplemental ration of corn had much fewer parasites than those not given this ration.

(4) Nursing calves acquired more parasites by grazing during the spring and summer on contaminated pastures than by grazing on improved or unimproved pastures that had been rested during the previous winter. Studies showed, moreover, that the highest accumulation of parasites in such calves occurred early in the fall, which suggests the time for medicinal treatment to secure maximum benefits.

(5) Common scabies in cattle acquired from sheep has persisted for over 18 months, producing the characteristic skin lesions in the bovines. The disease was experimentally transmitted from an infested cow to a calf, showing that the sheep scab parasites can adapt themselves to bovine hosts, and that sheep may be a source of infestation for cattle.

(6) Lindane was found to be effective in curing cattle scabies. Better results were obtained when scabby cattle were sprayed with lindane indoors than outside, and also when about 5 gallons of spray were used to thoroughly cover the animal than when smaller amounts were used.

(7) After 2 to 3 years of experimental treatment of cattle on an area basis, to destroy grubs, these pests have been reduced to practically negligible numbers. In areas of South Dakota the average number of grubs per animal in the treated areas was from 2 to 4, whereas in nearby untreated areas it was between 31 and 33. In central Washington the cattle that were adequately treated for 2 years in succession had an average of a little over 1 grub per animal, and only about 2½ percent were infested, whereas nearly 80 percent of the untreated cattle nearby were infested with an average of about 10 grubs per animal.

(8) About 95 percent of yearling range cattle in Oklahoma were found to be grubby in the fall of 1951, with an average of 32 grubs each. The extent and degree of infestation was lower in the older animals. At slaughter time the grub damage was estimated at about $2 per head.

(9) Low-grade parasitic infections acquired by cattle and sheep on western ranges can develop with almost explosive violence on lush farm pastures. Nearly 20 percent of the calves in a small herd in the South, and 33 percent of the ewes and 10 percent of the lambs of a flock of sheep in the Midwest, died from severe parasitism, the animals in both instances having been purchased in the West. The low-grade parasitic infections which these animals harbored originally, without showing any ill effects, pyramided to such heights on farm pastures in the spring and summer as to produce the death losses mentioned and to severely reduce the quality and weight of the survivors.

(10) Sheep on areas of the Northern Plains were found to have fewer parasites, and were, therefore, of better weight and condition than in former years, when scouring, unthriftiness, and death losses were common. The improved condition was due, in part, to more range and improved management, which tended to keep parasites at low levels. Some bands and flocks that were less thrifty showed correspondingly heavier loads of internal parasites.

(11) Under experimental conditions lambs were injured to a greater extent by lungworms than adult sheep. Moreover, greater injury was sustained by lambs which acquired this parasitic infection rapidly than by those that acquired it slowly. The most severely affected lambs had an intermittent cough, reduced appetite, and were retarded in weight.

(12) Free-choice administration to lambs of salt medicated with phenothiazine prevented the acquisition of damaging loads of intestinal wireworms and stomach

worms. These two parasites, acting together on pastured sheep, produced anemia, diarrhea, weight loss, and death. The anemia produced by the stomach worms aggravated the diarrhea produced by wireworms. The lambs protected by the medicated salt remained in good health while on pasture, whereas other lambs having access only to nonmedicated salt developed severe symptoms.

(13) Nearly 90 percent of the sheep raised on irrigated pastures in New Mexico were found to be parasitized, and of those so affected nearly 25 percent carried heavy loads of roundworms, including the kinds that produce a severe anemia and debilitating diarrhea. Raising sheep on irrigated pastures is on the increase in New Mexico and elsewhere in the Southwest, and the internal parasite problem—always serious in pasture-raised sheep—is assuming importance in the economy of lamb and wool production even in semiarid areas.

(14) The liver fluke, once established in sheep, can persist in these animals throughout life. Although old, parasitized sheep showed no apparent ill effects, they passed the liver fluke eggs with their droppings throughout their life and could serve, therefore, as sources of infection to susceptible animals, principally cattle, sheep, and goats.

(15) A proprietary remedy, widely advertised for the removal of tapeworms from sheep and small animals, was found by trials on sheep, dogs, and other test animals to be inferior to other treatments already in use. Information of this type protects farmers from investing in, or relying upon, unsatisfactory or useless medication.

(16) Contrary to common belief, not all goat parasites are readily transmissible to sheep. On a pasture previously grazed by parasitized goats, lambs acquired almost no parasites, although kids grazing with them developed severe diarrhea due to intestinal threadworms. Over the period that the lambs gained between 70 and 90 pounds, the kids lost 2 to 3 pounds each. This influence of nonfatal parasitism on growth is illustrative of the insidiousness of internal parasites.

(17) A deep freezer maintained at −20° F. destroyed trichinae in fresh pork stored there for 6 to 7 days. In pieces of pork weighing more than 30 pounds the longer period was required to effect the destruction of all the trichinae, which are the cause of trichinosis—a serious parasitic disease acquired by human beings as a result of eating raw or undercooked pork.

(18) In preliminary tests it was found that growing pigs protected from internal parasites gained practically as much weight on regular feed as did parasitized pigs on a special growth-promoting diet containing aureomycin and vitamin B^{12}. Although the special feed stepped up the growth rate of the nonparasitized pigs very sharply, the effects of the internal parasites on other pigs offset almost entirely the stimulating effects of the growth-promoting factors in the diet.

(19) Toxaphene was added to the list of treatments that will cure hogs of mange. The concentration of the chemical must be at least 0.5 percent.

(20) The extent and severity of mange in hogs in the Midwest is being pushed back significantly by new treatments tested and standardized in the course of research carried out in this Bureau. Benzene hexachloride and chlordane are reducing mange in swine in several important hog-producing areas investigated, whereas in former years this parasitic disease did much damage and lowered considerably the value of the affected animals.

(21) Crop worms, a cause of heavy death losses in turkeys in the fall, when the birds are nearing market age, can take refuge in the bodies of earthworms, where they are protected from drouth and other unfavorable influences, which would kill them in the open. In earthworms, moreover, the larvae of these parasites are carried over from one season to another, turkeys becoming infected as a result of swallowing the parasitized earthworms.

(22) Creosote was found to be effective in destroying the organisms which cause coccidiosis in chickens. The infective parasites which produce this disease persist in the soil of poultry yards and runs for many months, and retain their vitality. Out of 30 different chemicals tested on contaminated soil, creosote yielded the best results.

(23) A cheap chemical, known as toluene, was found to be a safe and effective treatment for the removal of stomach bots and large roundworms of horses. The antiparasitic action of this chemical was discovered recently by the Bureau in trials for the removal of hookworms and other parasites from dogs.

(24) In comparative studies of parasitism in rabbits raised in hutches and on the ground, it was found that at least 10 percent of the rabbits raised on the ground died from parasitism, principally coccidiosis, and there was, moreover, a 10 percent loss in the dressed weight of the survivors. Liver coccidiosis occurred 150 times more frequently, and intestinal coccidiosis was 15 times more prevalent, in ground-raised rabbits than in those raised in hutches.

Animal Disease Control and Eradication

Eradicating Tuberculosis and Brucellosis

Current activities

An extensive cooperative field program is conducted to eradicate tuberculosis and brucellosis (Bang's disease). Work is carried on in all States; tuberculosis eradication is also carried on in Hawaii, Puerto Rico, and the Virgin Islands, and brucellosis (Bang's disease) eradication in Puerto Rico. Indemnities are paid for cattle under certain legal and administrative restrictions.

Examples of recent progress

(1) The incidence of tuberculosis in cattle tested was further reduced from 0.14 to the new low figure of 0.11 percent during the past fiscal year. Cattle tested numbered 9,164,265 compared with 8,847,228 for the previous year; 10,351 reactors were removed from the 488,769 herds tested.

(2) During the past year the Meat Inspection Division continued to give valuable assistance in locating the remaining centers of infection. In several States where brands are registered, as many infected farms or ranches have been disclosed through reports from Meat Inspection as were found through the testin program. In other States where permanent marking of cattle is not practiced, efforts have been made for several years to provide for such marking under State laws or regulations, in the interest of possible reduction of the amount of testing now required to locate the remaining infected herds. The testing program, therefore, cannot be diminished until some better method can be substituted for it.

(3) In the fiscal year 1952 the milk test was adopted as an official adjunct to the brucellosis eradication program. The use of this test, which is adaptable to dairy herds, results in a considerable saving of time of veterinary personnel through the use of technicians for sample collection and the elimination of the use of the blood agglutination test in negative herds which constitute approximately 70 percent of the herds. It has proved to be the most feasible method of testing all the cattle in a State in sufficient time to allow for followup retests within the recommended period.

(4) The incidence of brucellosis in cattle given the blood-agglutination test increased from 3.1 to 4.2 percent during the past fiscal year, due to the high percentage of reactors found in Wisconsin, where a large majority of the herds given the blood-agglutination test were those in which there had already been a positive reaction to the milk test. During the year, 7,491,327 blood agglutination tests were made on cattle in 670,738 herds disclosing 314,260 or 4.2 percent reactors. Last year the blood-agglutination test was applied to 5,640,836 cattle and 172,322 or 3.1 percent reactors. If data for Wisconsin are omitted, only 2.7 percent of the 6,022,007 cattle tested in 1952 reacted, as compared with 3 percent of reactors among the 5,191,130 tested in 1951. Of 207,407 Wisconsin herds given the milk test, 62 percent showed freedom from infection and were eliminated from the list of those herds to be given the blood agglutination test. The result was a much higher incidence of infection among animals given the blood-agglutination test than would have been the case had the milk test not first been used to determine freedom from infection.

(5) Three hundred and forty-five counties located in 18 States and Puerto Rico were listed as modified certified brucellosis-free areas. North Carolina, New Hampshire, and Maine are the only States in which all counties have qualified for that status, although some others are approaching it.

(6) During the past 12 months a brucellosis program has been inaugurated in one of the largest dairy-producing States which has set a pace and pattern that appears to be capable of eradicating the disease. The most stimulating factor in this program has been a so-called milk order which requires the producer either to have his herd certified brucellosis-free or to be operating under a plan which will result in this end by a specified date. A valuable aid in furthering the program within this State has been the use of the film produced by the Bureau, entitled "The Triple Threat of Brucellosis." This film has been acclaimed as one of the best working tools ever produced for stimulating interest in the brucellosis-eradication program.

(7) Calf vaccination with strain 19 vaccine increased 25 percent over the previous year. 3,179,251 calves were officially vaccinated, bringing the total vaccinations since the inauguration of this practice in 1941 to 13,376,941.

(8) Comparison of funds provided by the Federal Government and cooperating States and counties for the eradication of tuberculosis and brucellosis for the fiscal year 1953 is as follows:

	Tuberculosis		Brucellosis	
	Federal Government	Cooperators	Federal Government	Cooperators
Operating funds	$1,750,000	$4,928,075	$3,209,030	$6,870,571
Indemnity payments	250,000	1,165,662	900,000	1,747,625
Total	2,000,000	6,093,737	4,109,030	8,618,196

ERADICATING SCABIES

Current activities

Inspection and dipping for cattle and sheep scabies is carried on cooperatively in 29 States. Premises and other specified areas are quarantined as required. These skin diseases are highly contagious and if unchecked cause great financial losses in flesh, unthrifty condition and arrested growth. At times death losses are heavy. In sheep there is also a marked decrease in the quantity and quality of wool produced.

Examples of recent progress

(1) The intensive eradication program in Louisiana and Mississippi was continued and satisfactory progress reported. Due to this drive infection has been disclosed in areas previously believed to be free. As the federally quarantined area in Louisiana lies adjacent to Texas, subjecting that State to exposure, a dipping program is also in progress in Texas. During the year sheep scabies was reported as existing in 24 States, and its occurrence in some of these areas formerly believed to be free of the disease was traced to irregular movements from States with known infections. Activities have continued with cooperating States in an effort to eradicate the infection wherever found.

Sheep and cattle scabies eradication in the past fiscal year is indicated by the following table:

	Sheep		Cattle	
	Fiscal year 1951	Fiscal year 1952	Fiscal year 1951	Fiscal year 1952
Field inspections	5,278,723	7,228,543	444,364	217,116
Dippings	579,107	687,271	4,436	8,220
Infected animals	69,121	126,405	1,081	3,124
Exposed animals	149,338	175,740	1,098	1,369

ERADICATING CATTLE TICKS

Current activities

The inspection and dipping for cattle fever ticks is carried on in close cooperation with State and county authorities and cattle owners in Florida and in parts of Texas and California adjacent to the Mexican border. A systematic eradication program is also in progress in Puerto Rico. Originally over one-fourth of the country was under quarantine for tick fever. At present the disease in the United States is limited to areas adjacent to Mexico. The danger of reinfestation is constantly present due to our close proximity to tick-infested areas in Mexico and islands in the West Indies. Vigilance in dealing effectively with outbreaks that occur from time to time is of prime importance to the livestock industry of the South.

Examples of recent progress

(1) Bureau and cooperative employees supervised 4,464,251 inspections or dippings of cattle and 393,525 inspections or dippings of horses and mules. In Puerto Rico where systematic dipping is under way it was also necessary to treat sheep and goats on infested premises, because the infection is of the tropical variety of fever tick. This required 422,493 inspections or dippings. Total inspections and dippings were 5,280,269 as compared with 5,703,945 in the fiscal year 1951.

(2) In Florida, periodic inspections were continued in the area where the latest reinfestation was found and at all auction markets to determine whether

there was any remaining infestation. No cattle fever ticks were disclosed. Danger of reinfestation, however, is constantly present due to the close proximity of Florida to tick-infested countries and islands in the West Indies with which there is extensive commerce.

(3) In California and Texas, ticks on stray or smuggled animals from Mexico continue to be a major problem. Reinfestations in Texas are constantly occurring as a result of these illegal movements.

CONTROL OF HOG CHOLERA AND RELATED SWINE DISEASES

Current activities

Assistance is given to swine growers and others in preventing or controlling outbreaks of hog cholera and related swine diseases. Efforts are made to secure the widest application of the best known effective preventive and control measures in order to reduce swine losses from disease.

Examples of recent progress

(1) No serious outbreaks of hog cholera were reported during the year and for the second year in succession there have been no breaks reported to be due to variant virus. However, hog cholera still exists in practically all parts of the country where hogs are raised and continues to be the most serious of swine diseases because of the enormous losses incurred when it strikes an unprotected herd. Some breaks following vaccination with some of the new type vaccines have been investigated. They appear to have been due largely to misuse, experimentation with the new product, or the result of use by farmers not qualified to administer the product.

Another relatively new disease, atrophic rhinitis, appears to be spreading and becoming a serious problem in some areas as heavy losses are frequently reported.

DETERMINING THE EXISTENCE OF DISEASES IN THE FIELD

Current activities

Investigations are made of diseases which appear to be of a communicable nature in order that prompt control and eradication measures may be taken without delay. In recent years investigations for the most part have covered vesicular diseases simulating foot-and-mouth disease and such diseases as dourine of horses, anthrax, and equine encephalomyelitis.

Examples of recent progress

(1) Many reports of disease simulating foot-and-mouth disease were investigated but proved not to be that disease. All cases of animal and poultry diseases suspected as being of foreign origin were promptly investigated to insure prompt detection and appropriate protective measures.

(2) No case of dourine was found among horses of the United States during the past fiscal year. However, a number of stray animals from Mexico were tested and found to be reactors, as were several offered for importation from Mexico. This shows the need for early detection and continued vigilance in the States along the Mexican border in order to prevent the dissemination of the disease in the United States should it gain entrance.

(3) Widespread outbreaks of anthrax occurred during the past year not only in the States where this disease is usually prevalent but in some of the Midwestern States which have been free of this infection for many years. Bureau employees continued to furnish assistance in administering preventive treatment against this desease to Indian-owned cattle on reservations as well as cooperating with State livestock sanitary authorities, public health officials, and others in controlling the unusual number of outbreaks of anthrax that have been reported.

(4) Vesicular exanthema, a disease previously confined to California, was diagnosed in the latter part of June in Wyoming and Nebraska. There was considerable spread of the disease although efforts were made to diagnose it promptly and to localize infection by application of quarantines. This disease has appeared in 31 States, including California.

(5) Scrapie, a destructive, infectious, virus disease of sheep was diagnosed in California in October 1952. The disease was present in two purebred flocks.

IMPORT-EXPORT INSPECTION AND QUARANTINE

Current activities

Measures are taken to safeguard the livestock and poultry industries against serious losses by preventing the introduction of dangerous diseases of foreign origin. Work is conducted at sea, air, and border ports. Livestock and poultry offered for importation into this country are inspected and when necessary are quarantined. The importation of animal products, hay, straw, and similar materials which might be the means of introducing dangerous diseases is also supervised. This includes prevention of the landing of meats as sea-stores or cargo or of garbage derived from meats from countries where dangerous animal diseases exist.

Purebred animals are further examined at ports of entry for identification purposes to determine their eligiblity for entry free of customs duty.

Livestock offered for export are also inspected for diseases. Facilities on transporting vessels are required to meet rigid specifications to assure humane handling and safe transport of the animals.

Examples of recent progress

(1) More than 158,000 animals (including poultry) were inspected for disease at ports of entry during the fiscal year 1952. Of the animals inspected, 409 (including poultry) were refused entry on account of disease. The decrease from approximately 470,000 animals inspected in the fiscal year 1951 was due largely to decreased importations of Canadian cattle during the first part of the fiscal year and the prohibition against such entries on and after February 25, 1952, because of the existence of foot-and-mouth disease there.

Ports of entry	Cattle	Swine	Sheep	Goats	Equines	Poultry	Other
Ocean	1,410	441	942	1,321	561	3,272	29
Canadian	111,440	1,741	7,353	101	11,629	6,991	16
Mexican					10,877		
Total	112,850	2,182	8,295	1,422	23,067	10,263	45

(2) The identification and certification of purebred animals for free entry, by species was as follows: 216 horses; 12,336 cattle; 2,259 sheep; 151 swine; 3 goats; 690 dogs; 7 cats; a total of 15,662 for the fiscal year 1952.

(3) During the past fiscal year, 57,600,827 hides and skins were imported. Of this total, 2,958,931 were permitted entry subject to further restrictions. Sanitary control was exercised over 15,197,129 pounds of animal casings admitted to the United States, consisting of 13,495,724 pounds of certified casings and 1,701,405 pounds of casings.

(4) Animals inspected for exportation during the past year are shown by species and country of destination in the following table:

Kind of animal	Canada	Mexico	Other countries	Total
Cattle	1,076	1,763	4,971	7,810
Swine	25	728	507	1,260
Sheep	35	1,038	324	1,397
Goats	32	96	158	286
Horses	55	544	783	1,382
Mules	1	1,182	7,208	8,391
Asses	0	4	13	17
Total	1,224	5,355	13,964	20,543

SUPERVISION OVER INTERSTATE MOVEMENT OF LIVESTOCK

Current activities

Inspections are made of livestock received at the larger public markets in order to prevent the spread of disease. When diseases are found, appropriate control measures are taken. Railroad cars, trucks, chutes, alleys, pens, etc., are disinfected under Federal supervision as required. The existence of disease is reported to the district of origin in order that steps may be taken promptly to localize or

eradicate it. The detection at these locations of diseases and reporting in this manner is an invaluable safeguard to the livestock industry. Measures are also undertaken to enforce the 28-hour law which is designed to prevent overconfinement of animals in interstate transit by common carrier; and to assure proper feeding, watering, and resting, thereby reducing losses through shrinkage, injury, etc.

Examples of recent progress

(1) Volume of work during fiscal year 1952 is reflected in the following tables:

INSPECTION AT PUBLIC STOCKYARDS

	Fiscal year 1951	Fiscal year 1952
Number of stockyards operating	49	49
Number of cities in which located	45	45
(During fiscal year 1952 inspection was discontinued at 3 stockyards.)		
Animal inspection:		
Cattle	20,287,446	20,201,543
Sheep	12,036,367	12,448,631
Swine	31,732,447	34,564,342
Total animals inspected	64,056,260	67,214,516
Animals dipped and immunized:		
Cattle dipped	2,692	0
Sheep dipped	273,729	352,828
Swine immunized	257,511	239,829
Total animals dipped and immunized	533,932	592,657
Health certificates issued for shipments	163,162	184,129
Infectious cars received	169	237
Cars cleaned and disinfected	1,653	1,707
Trucks cleaned and disinfected	3,518	3,790
Diseased animals detected (excludes those reacting to tests for tuberculosis and brucellosis)	19,801	24,975

ENFORCEMENT OF ANIMAL QUARANTINE ACTS

Violations investigated by the Bureau	18	49
Violations referred to the Solicitor of the Department	22	1

These violations were fully investigated, and on 48 cases there was insufficient evidence to warrant prosecution. In three cases carried over from the previous year, fines amounting to $1,200 and costs were imposed by the courts.

Reports of violations of the 28-hour law during the past fiscal year numbered 461. In addition, 15 reported violations were under investigation at the beginning of the year. Recommendations were made to the Solicitor of the Department for the prosecution of 160 cases; 286 were filed without action on information accompanying the report. At the end of the year 30 cases were under investigation. Penalties aggregating $13,850 were imposed by the courts on 135 violations.

CONTROL OF MANUFACTURE, IMPORTATION, SHIPMENT, AND MARKETING OF VIRUSES SERUMS, TOXINS, ETC.

Current activities

Work covers enforcement of the provisions of the Virus-Serum-Toxin Act to insure that all veterinary biological products manufactured under license will accomplish the purpose for which intended: To prevent marketing of products that are worthless, contaminated, dangerous or harmful, and to control the importation and interstate shipment of disease organisms, thereby protecting the Nation's livestock and poultry industries against impure and impotent biological products and dissemination of disease through the uncontrolled movement of disease organisms and vectors.

Under authority of sections 56 to 60, inclusive, of the act approved August 24, 1935 (7 U. S. C. 851–855), the Secretary has entered into a marketing agreement with manufacturers and other handlers of hog-cholera virus and anti-hog-cholera serum which provides for the maintenance of adequate stock for the protection of

swine producers. Regulations prescribed by the Department to prevent undue and excessive fluctuations in price, unfair methods of competition, and unfair-trade practices are administered by a control agency representing the industry. The Bureau's work includes reviewing the acts of the control agency, assembling data on production, sales and prices, and conducting investigations.

Examples of recent progress

(1) Outstanding licenses under the Virus-Serum-Toxin Act permitted production of 104 different biological products as of June 30, 1952. Several products are manufactured in more than one form, so that the total number of different products was 183. The progress and anticipated extent of work under the project is reflected in the following table:

	Actual, fiscal year 1952	Estimated, fiscal year 1953	Estimated, fiscal year 1954
(*a*) Establishments producing antihog-cholera serum and hog-cholera virus	33	32	30
Production (cc):			
Serum (completed product)	1,380,433,550	1,490,862,300	1,518,476,900
Virus:			
Simultaneous	85,431,500	89,703,000	92,266,000
Hyperimmunizing	268,582,800	290,037,000	295,408,080
Inoculating	969,700	10,472,800	10,666,700
Animal inspections	3,844,200	4,190,200	4,228,600
Tests supervised	13,900	15,300	15,300
(*b*) Establishments producing hog-cholera vaccine	11	15	17
Production (doses)	30,423,400	33,500,000	40,000,000
(*c*) Establishments producing other biologics	37	40	40
Production:			
Cc	778,069,200	816,973,000	840,315,000
Milligrams	136,744,800	143,582,000	147,684,000
Disks	303,800	300,000	250,000
Units	551,881,400	579,475,000	596,032,000
(*d*) Products destroyed (all kinds):			
Cc	81,232,400	90,980,000	93,417,000
Milligrams	16,347,400	17,164,000	17,655,000
Disks	2,000	2,000	2,000
Units	16,741,400	17,578,000	18,080,000
(*e*) Export certificates issued	947	1,000	1,000

(2) Three thousand eight hundred and one samples of biological products and subcultures of organisms were collected and forwarded to the Bureau for testing. Included in these were 2,676 samples of Brucella abortus vaccine, of which 5.6 percent were found unsatisfactory when examined in the Bureau laboratories. These unsatisfactory batches of Brucella abortus vaccine were destroyed under Bureau supervision and represented 1,991,862 cc., or enough vaccine to treat 331,997 calves. In the course of 2,238 purity and safety tests on hog-cholera virus, approximately 10 percent of the batches tested were suspected of containing the swine erysipelas organism. When subjected to laboratory examination, approximately 6 percent were found to contain the erysipelas organism and the virus was destroyed under the supervision of a Bureau inspector.

(3) The following table shows the volume of biological products certified for export:

Products [1]	Fiscal year 1950	Fiscal year 1951	Fiscal year 1952
Antihog-cholera serum (cubic centimeters)	23,992,000	23,643,000	24,959,000
Other serums	61,000	99,000	171,000
Hog-cholera virus (cubic centimeters)	815,000	961,000	878,000
Aggressins	3,000	8,000	8,000
Antitoxins (units)	4,800,000	7,038,000	5,696,000
Bacterins	2,892,000	4,513,000	4,389,000
Diagnostics	312,000	400,000	230,000
Vaccines	2,186,000	5,584,000	7,246,000

[1] Doses unless otherwise indicated.

(4) The following table shows comparable figures by fiscal years of the number of handlers operating under the marketing agreement and order:

	Actual		Estimated	
	1951	1952	1953	1954
Producer-handlers	32	31	31	30
Distributors-handlers or equivalent, including wholesale purchasers and handlers	262	244	237	240

(5) *Control Agency.*—Following a uniform method for the determination of minimum qualifications for wholesalers, handlers were screened to ascertain whether they were properly classified under the order and numerous changes in classification were initiated. An interpretive ruling by the Solicitor resulted in the deletion of a number of branch houses of corporations, partnerships, or other business units previously classified as separate entities on the basis that such business units are entitled to only one classification under the order regardless of the number of branch houses or divisions owned.

Posting of dual prices because of brand names or other means of identification was prohibited by amending rules and regulations of the control agency.

Meat Inspection

Current activities

Enforcement of the Federal meat-inspection laws assures production of disease-free, clean, and wholesome meat and meat products for both civilian and military use and for foreign commerce. This is accomplished by supervising slaughtering and meat-processing operations at meat-packing plants, application of controls over imported meats to assure the same protection as in the case of meats produced domestically and a system of certification of meats for export to keep foreign markets open to American meats. Work is also performed on a reimbursable basis for other Government agencies to assure specification compliance in governmental purchasing.

Examples of recent progress

(1) *Meat inspection volume increased in 1952.*—The total volume of meat-inspection work expanded as a result of the substantial increase in the number of hogs marketed last year.

The scope of operations under the meat inspection laws is indicated by the following tables:

	1950	1951	1952
At close of fiscal year:			
Number of establishments covered	928	947	965
Number of cities and towns in which establishments were located	363	387	381
Ante mortem inspection:			
Animals passed	87,476,433	88,435,213	92,460,187
Animals suspected	249,281	225,586	286,615
Animals condemned	6,820	6,262	9,448
Total animals inspected	87,732,534	88,667,061	92,756,250
Post mortem inspection:			
Carcasses passed	87,428,617	88,368,122	92,361,681
Carcasses condemned	295,221	291,124	383,287
Total carcasses inspected	87,723,838	88,659,246	92,744,968
Inspection of animals by species:			
Ante mortem inspection (animals):			
Cattle	13,119,481	12,573,931	12,183,042
Calves	6,234,999	5,362,092	4,808,303
Sheep and lambs	12,247,510	10,728,566	11,219,553
Goats	122,240	77,951	28,868
Horses [1]	240,012	319,605	322,083
Swine	55,768,292	59,604,916	64,194,401
Total	87,732,534	88,667,061	92,756,250
Post mortem inspections (carcasses):			
Cattle	13,115,889	12,570,825	12,179,375
Calves	6,234,261	5,361,363	4,807,524
Sheep and lambs	12,246,809	10,727,927	11,218,394
Goats	122,233	77,937	28,863
Horses [1]	240,010	319,601	322,064
Swine	55,764,636	59,601,593	64,188,748
Total	87,723,838	88,659,246	92,744,968

[1] Horses are slaughtered and their meat is identified as such. It is handled and prepared in separate establishments from those handling cattle, calves, sheep, swine, and goats.

Meat and meat food products prepared and processed under Federal inspection by fiscal years

Fiscal year:	*Pounds*
1950	14,146,903,556
1951	15,916,481,602
1952	16,551,131,411

Meat and meat food products classified by type of product

	Fiscal year 1950	Fiscal year 1951	Fiscal year 1952
	Pounds	*Pounds*	*Pounds*
Placed in cure:			
Beef	110, 639, 982	106, 231, 571	111, 441, 403
Pork	3, 435, 780, 953	3, 532, 244, 469	3, 698, 242, 631
Smoked and/or dried:			
Beef	50, 865, 406	59, 260, 259	59, 244, 739
Pork	2, 055, 293, 137	2, 306, 150, 036	2, 478, 583, 033
Sausage:			
Fresh finished	240, 878, 222	313, 073, 012	219, 614, 070
Smoked and/or cooked	961, 719, 027	1, 003, 139, 455	1, 069, 668, 155
To be dried or semidried	117, 477, 505	119, 426, 862	113, 626, 475
Loaf, headcheese, chile con carne, jellied products, etc	177, 679, 181	192, 208, 995	191, 928, 018
Cooked meat:			
Beef	35, 300, 165	60, 279, 490	59, 662, 319
Pork	604, 394, 554	444, 336, 075	426, 272, 147
Canned meat and meat food products:			
Beef	93, 522, 249	296, 697, 662	299, 268, 553
Pork	532, 835, 662	604, 175, 876	480, 098, 966
Sausage	77, 899, 692	125, 142, 939	106, 257, 632
Soup	437, 513, 467	428, 791, 468	472, 627, 728
All other	402, 635, 605	428, 303, 386	316, 881, 607
Bacon, sliced	739, 962, 146	749, 902, 396	802, 232, 998
Lard:			
Rendered	1, 871, 395, 554	2, 010, 030, 294	2, 205, 004, 579
Refined	1, 340, 627, 407	1, 499, 953, 242	1, 583, 793, 362
Rendered pork fat:			
Rendered	108, 571, 605	102, 353, 574	111, 051, 438
Refined	58, 201, 056	53, 539, 620	59, 341, 869
Oleo stock	99, 440, 098	103, 178, 178	89, 254, 896
Edible tallow	66, 642, 581	75, 156, 165	67, 603, 997
Compound containing animal fat	237, 856, 460	286, 518, 083	283, 270, 395
Oleomargarine containing animal fat	22, 510, 055	21, 006, 993	20, 462, 047
Miscellaneous	228, 758, 118	927, 786, 214	1, 156, 115, 223
Horse meat products:			
Cured	704, 206	4, 908, 008	5, 581, 057
Chopped	27, 951, 791	41, 792, 780	45, 137, 535
Canned	7, 067, 033	17, 169, 023	14, 676, 423
Rendered fat	2, 780, 639	3, 724, 877	4, 188, 116
Total	14, 146, 903, 556	15, 916, 481, 602	16, 551, 131, 411

Examination of meat and meat food products for other Government agencies (reimbursable)

Branch of Government	Fiscal year 1950	Fiscal year 1951	Fiscal year 1952
	Pounds	*Pounds*	*Pounds*
Department of the Navy	173, 436, 541	264, 700, 052	393, 494, 290
Commodity Credit Corporation (supply programs)	12, 313, 413	1, 137, 650	
Coast Guard	745, 977	178, 727	251, 740
Marine Corps	10, 714	97, 076	141, 216
Department of Interior	28, 204	12, 191	36, 257
Veterans' Administration	4, 937, 609	3, 701, 504	3, 660, 921
Department of the Army	91, 990	76, 937	59, 667
Maritime Commission		8, 621	1, 281
Department of Justice	90, 813	98, 205	96, 724
Department of Commerce			66, 390
Federal Security Agency			15, 909
All others	51, 279	63, 985	
Total	[1] 191, 706, 540	[2] 270, 074, 948	[3] 397, 824, 395

[1] Includes 1,858,679 pounds rejected.
[2] Includes 3,538,216 pounds rejected.
[3] Includes 4,137,589 pounds rejected.

Summary of samples examined in laboratories for determination of adulteration or other objectionable conditions, fiscal year 1952

	Number examined	Reported adversely
Meat and meat food products	13,660	1,821
Edible fats and oils	325	11
Binders (cereal, dried skim milk, soya flour)	1,302	33
Curing materials	1,805	36
Water	2,835	70
Miscellaneous	1,885	113
Samples of animal foods	122	10
Imports	2,650	171
Seasonings (spices, flavorings, etc.)	4,350	51
Total	28,934	2,316

Examination of labels and sketches, fiscal year 1952

	Fiscal year 1952
Number of labels and sketches approved	21,580
Number of labels approved for imported meat	768
Number of labels and sketches refused approval	2,347
Total number of labels and sketches reviewed	24,695

Inspection of imported meat and meat food products

Fiscal year	*Pounds*
1950	229,147,254
1951	342,259,142
1952	339,589,208

(2) During the past year approximately 700 cases of disease conditions in food animals slaughtered at abattoirs with Federal inspection were examined and diagnosed. The work of these cases usually involved histopathological studies, and frequently also bacteriological studies and animal inoculation tests. A wide variety of pathological conditions were diagnosed, including numerous malignant tumors and infectious diseases, among which were several types transmissible to man. Bacteriological tests of food products for spoilage and food-poisoning organisms also were made.

(3) A continuing study is being made on "pinpoint" lesions in the submaxillary lymph nodes of swine to determine the causative agent in these lesions by histopathologic and bacteriologic examinations.

(4) Samples of imported meat products containing pork were examined for trichinae, and none were found to contain the live parasites. One sample of back bacon contained a few dead trichinae.

STATEMENT OF OBLIGATIONS UNDER ALLOTMENTS AND OTHER FUNDS

(Includes only those amounts which, by November 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases.)

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, Agriculture (Bureau of Animal Industry): Marketing research	$37,063	$19,600	$29,000
Working funds, Agriculture, Animal Industry, advanced from:			
Atomic Energy Commission:			
For research on the metabolism of the embryo and the effects of internal radiations	31,972		
For research on the effect of radiation on chickens with special reference to egg production and other physiological factors	29,461		
Department of Defense, Department of the Army:			
Quartermaster Corps: For processing animals under foreign-aid program	18,000	51,240	
Research and Development: For special projects		158,170	
Federal Civil Defense Administration: For aid in establishing and conducting training in the detection and protection against certain animal diseases which might be used as biological-warfare agents	4,675		
Total, working funds, Agriculture, Animal Industry	84,108	209,410	
Inspection of animal foods, animal industry, Agricultural Research Administration (trust fund): For inspection and certification of animal foods upon application of an interested party, which service is financed by fees which are covered into the Treasury as a special trust fund and made available for the payment of expenses and refunds in connection with the work provided for under cooperative agreements	106,242	112,000	112,000
Expenses, feed and attendants for animals in quarantine, Department of Agriculture (trust fund): For expenses for feed and attendants for animals in quarantine at request of the importer, which service is financed by fees which are covered into the Treasury as a special trust fund and made available for expenses in connection with the work	6,688	15,029	15,000
Total, trust funds	112,930	127,029	127,000
Obligations under reimbursements from governmental and other sources:			
Salaries and expenses: For overtime meat inspection services furnished packers and other Government agencies	3,181,749	2,967,800	2,969,000
Other	119,902	219,405	255,705
Total	3,301,651	3,187,205	3,224,705
Total, obligations under allotments and other funds	3,535,752	3,543,244	3,380,705

Mr. ANDERSEN. Now, Doctor, we will be glad to hear from you.

GENERAL STATEMENT

IMPORTANCE OF LIVESTOCK IN AGRICULTURAL ECONOMY

Dr. SIMMS. I would like to open my statement, if I may, with a very brief review of the place that livestock occupies in agriculture as a whole in this country.

This chart shows the place that livestock has in the total agricultural income for our country for the year 1951.

(The chart referred to follows:)

CASH RECEIPTS FROM FARM MARKETINGS, 1951

Meat animals	$11, 308, 218, 000
Poultry and eggs	3, 666, 693, 000
Wool, mohair and other	303, 751, 000
Dairy products	4, 290, 299, 000
Total livestock	19, 568, 961, 000
Total crops	13, 052, 787, 000
Grand total	32, 621, 748, 000

The total agricultural income was $32.5 billion, and the total value of livestock products was over $19.5 billion of that. The 1952 income had not been announced when this chart was made. A 1952 chart would show livestock down to some $18.5 billion instead of $19.5, and the total would be about $33 billion.

But year after year, the income from livestock and livestock products brings in more than half of the total farm income for the country.

A second chart I would like for you to see, and this again is a review——

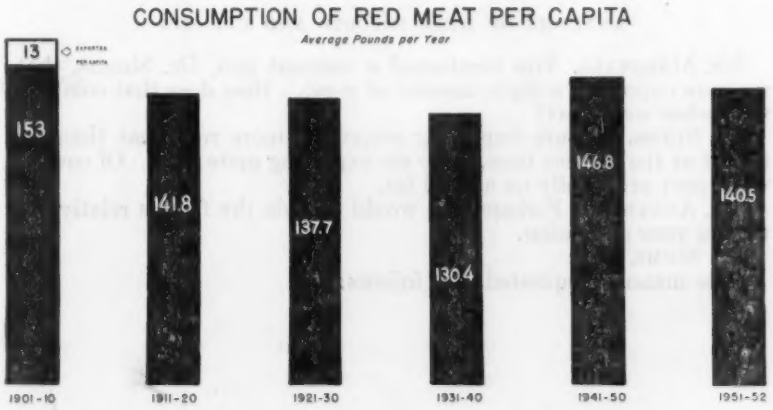
Mr. ANDERSEN. First, on the other chart, Doctor, I am personally surprised to find that the total livestock receipts, so far as agriculture is concerned, runs to such a large percentage. The chart shows it is approximately $20 billion out of the total gross of $32 billion. That in itself emphasizes the importance of your particular line of work.

Dr. SIMMS. Yes. This year was a little higher than the average for the last 10 years. I think it is only fair to say that, but it will run 55 to 57 or 58 percent of the total farm income year after year.

MEAT CONSUMPTION PER CAPITA

Here is another chart. We have shown this to the committee before, but we have brought it up to date. This is on meat consumption the country over.

(The chart referred to follows:)



Dr. SIMMS. I think most of us do not realize that we have not kept up with our population increase in our production of meat. This chart is by decades. In the first decade of the century, we ate 153 pounds of red meat for each man, woman, and child in the country, and had 13 pounds for export. So we produced about 166 pounds of meat per capita in the country.

We had a continuously declining curve by decades up to the decade of 1941 to 1950, when we stepped up our meat production and ate 146 pounds.

Then the first 2 years of this decade went down to about 141 pounds. It looks as if we are starting into a second decline. This year's meat production might bring that up just a little bit, but it is surely true that in the first 3 years of this decade our meat production and consumption will be below what it was the first 3 years of the decade just past.

Incidentally, I might say instead of the 13 pounds of red meat per man, woman, and child that we exported at the beginning of the century, now there is meat importation. It is not very much, but we are bringing in some more red meat than we are sending out.

Mr. ANDERSEN. What is your explanation of the trend downward?

Dr. SIMMS. Well, we are eating, and we have from about this point [indicating] on, eaten all the meat we have produced. We have not produced enough meat to give our people the 145 or 146 pounds that they were eating 10 years ago. Not only are we eating nearly all we are producing, but we are importing about 2½——

Mr. ANDERSEN. There has been evidence before this subcommittee this year to the effect that the average workingman is paying less in percentage for his food today than he paid in years 1929 and 1939.

Dr. SIMMS. Yes.

Mr. ANDERSEN. And it cannot be attributed to the fact that he is not earning sufficient to pay for it.

Dr. SIMMS. No, but we are eating all we produce. We have not had any excess meat in this country for 40 years, as a matter of fact, except particular types or particular short periods.

ANALYSIS OF MEAT IMPORTS AND EXPORTS

Mr. MARSHALL. You mentioned a moment ago, Dr. Simms, that we were importing a slight amount of meat. How does that compare with what we export?

Dr. SIMMS. We are importing somewhat more red meat than we export at the present time. We are exporting more lard. Of course, we import practically no animal fat.

Mr. ANDERSEN. Perhaps you would include the figures relative to that in your discussion.

Dr. SIMMS. Yes.

(The material requested is as follows:)

Quantity of meat and meat-food products certified for export, fiscal year 1952

Product	Pounds	Totals
Beef and/or veal:		
Fresh	3,559,521	
Cured or smoked	9,431,019	
Canned	463,523	
Edible organs	2,852,358	
Miscellaneous	608,268	
		16,914,689
Mutton and/or lamb:		
Fresh	230,696	
Cured or smoked	361	
Canned	2,669	
Edible organs	46,868	
Miscellaneous	41,494	
		322,088
Pork:		
Fresh	13,752,760	
Cured or smoked	87,355,287	
Canned	3,592,953	
Edible organs	3,715,178	
Miscellaneous	604,154	
		109,020,332
Sausage and luncheon meat		6,294,428
Canned, miscellaneous		4,982,916
Subtotal		137,534,483
Lard	634,554,270	
Rendered pork fat	55,028,657	
Other edible fats and oils	27,853,192	
		717,436,119
Horsemeat:		
Fresh	15,340,476	
Cured or smoked	5,781,739	
Canned	997,297	
Edible organs	148,803	
		22,271,315
Grand total		877,241,917

Foreign meat and meat food products passed for entry, fiscal year 1952

[In pounds]

Country of origin	Fresh meats and edible organs		Cured meats		Canned meats			Sausage (not canned)	Edible fats and oils	Miscellaneous	Total
	Beef and veal	Pork	Beef	Pork	Beef	Pork	Other				
Argentina			12,879,017	1,264,103	87,488,148	110,439	4,061,210			958,031	106,760,948
Australia	323,271	33,055			145,986		1,014,210			3,386,620	4,903,142
Belgium				129		7,384	129				7,642
Brazil			2,470,779		3,032,942	14,362	249,508			315	5,767,906
Canada	48,350,011	11,355,905	4,760	3,617,753	42,360	9,332,726	467,793	66,730	1,497,903	4,073,682	78,809,623
Cuba	124,204	2,103					1,500			1,676	129,483
Denmark			305,956	186,037		5,215,198	124,530	7,031		1,086	5,839,838
Dominican Republic	2,276,826	90,238		7,594		1,535	2,832	6,395		2,063	2,387,483
England			11,625	22,945			586,468			113,401	734,439
France			114,183	549	72	10,202	33,154	1,102		2,109	161,371
Germany						234,229					234,229
Netherlands			3,768	452,042		16,861,831	271,517	37,630			17,626,788
Honduras	171,867										171,867
Iceland										1,331,628	1,331,628
Ireland	16,962,438	7,000		10,668			19,200			1,173,292	18,172,598
Italy			72,093,110	35,927		3,291		631,439			634,730
Mexico					134,413		5,224,040			279,868	77,767,358
Norway							5,001				5,001
New Zealand	308,708	13,127								255,713	577,548
Paraguay					1,700,641		83,208				1,783,849
Poland						5,793,361					5,793,361
Spain								2,024			2,024
Sweden				6,124		95,341	236	661			102,362
Switzerland					18,000		13,946			3,265	35,211
Uruguay			2,855,845		6,405,308	9,000	719,702			68,406	10,058,261
Total	68,517,325	11,501,428	90,739,043	5,603,871	98,967,870	37,688,899	12,878,184	753,012	1,497,903	11,651,155	339,798,690

Frequency distribution of meat consumption by income and household size [1]

[Average quantity of meat consumed per person in a week (pounds)]

Income	All families	Number of persons in family			
		2	3	4	5 or more
Under $1,000	2.02	2.04			
$1,000 to $1,999	2.10	2.66	2.33	1.83	1.64
$2,000 to $2,999	2.27	3.09	2.53	2.15	1.83
$3,000 to $3,999	2.51	3.53	2.79	2.41	2.14
$4,000 to $4,999	2.58	3.30	2.84	2.57	2.19
$5,000 to $7,499	2.68	3.67	2.92	2.64	2.04
$7,500 and over	2.74				
All incomes: [2]	2.42	3.13	2.65	2.32	2.00

[1] From report made by Bureau of Human Nutrition and Home Economics following survey in spring of 1948 of 1,558 urban housekeeping families—1947 family income (after Federal income tax).
[2] Includes 147 families not classified by income.

Mr. ANDERSEN. Continue, Doctor.

FUNCTIONS OF BUREAU OF ANIMAL INDUSTRY

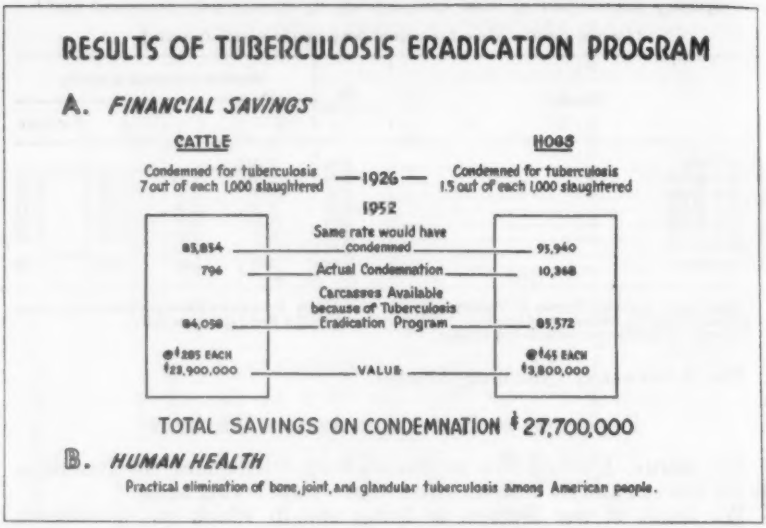
Dr. SIMMS. I would like to discuss very briefly now the functions of the Bureau and its activities and what we are trying to do.

We think of our Bureau as being one in which an investment is made. We believe we pay good income on the investment. We do not like to think that the Bureau of Animal Industry is simply an organization that takes Federal money and uses it, but we rather consider it as an investment, and we believe we pay good dividends on this investment.

TUBERCULOSIS CONTROL

As an illustration of what I am trying to say to you, I would like to show you just one more chart and give you a little history in connection with this.

(The chart referred to follows:)



Dr. SIMMS. Many years ago our record on tuberculosis in cattle in this country showed that year by year the numbers of animals condemned for tuberculosis on autopsy or in slaughterhouses was increasing. In other words, the disease was becoming more serious year by year.

In 1917 the Bureau of Animal Industry, in cooperation with the different States of the country, put on a tuberculosis eradication program. I have in this chart shown a comparison of carcasses condemned by our Meat Inspection Service between the years 1926 and 1952.

In 1926 we condemned 70,000 cattle and 63,000 hogs for tuberculosis. In 1952, if we had condemned at the same rate, we would have condemned 85,000 cattle and 95,000 hogs. We actually condemned seven hundred-odd cattle and 10,000 hogs.

The value of animals we would have condemned at the 1926 rate amounts to $23,900,000 for the cattle and $3,800,000 for the hogs, or a total of $27 mill on of condemnations that we would have had in 1952 alone had we not had a decrease in the rate of condemnation for tuberculosis.

These figures do not tell the whole story because the condemnations were going up until we started tuberculosis eradication. So when we say we actually saved $27 million worth of meat, we are being very conservative. That $27 million saved annually in meats not condemned is the result of the investment we have made in tuberculosis eradication program.

Mr. ANDERSEN. Doctor, I wish to put in the record something personal at this point.

My home county of Lincoln in Minnesota was the first accredited tuberculosis county, as far as human beings are concerned, in America.

Dr. SIMMS. Yes.

Mr. ANDERSEN. And I recall that back as early as 1919 there was considerable interest in that particular county in relation to this work on cattle and hogs that you are discussing.

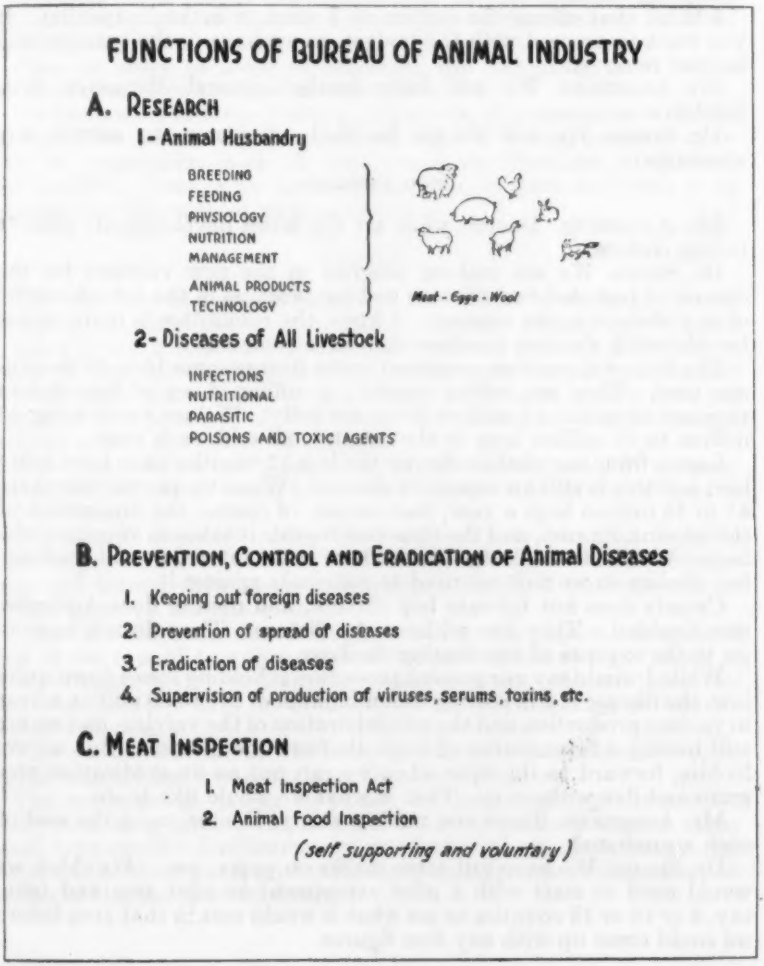
Dr. SIMMS. Yes.

Mr. ANDERSEN. My own little herd of cattle was the No. 2 herd in that county to be declared free both from tuberculosis and Bang's. That was back in the early 1920s.

Dr. SIMMS. We started this program in 1917, so you were right in on the ground floor if you started it at that time.

Our Bureau of Animal Industry, as you know, has three functions. One of these is research, one is control and eradication of diseases of livestock, and one is meat inspection. I have tried to show this very briefly on this chart.

(The chart referred to follows:)



RESEARCH ACTIVITIES

Dr. SIMMS. Our research in the Animal Husbandry Division is with all of the domestic animals except the dairy cow. Disease research covers all of the livestock. In other words, we include the dairy cattle too in our disease research. Our animal husbandry research includes breeding, feeding, physiology, nutrition, management, animal products technology—with sheep, beef and dual-purpose cattle, goats, hogs, poultry, and fur-bearing animals.

Disease work covers all of these including dairy cattle. Meat inspection, of course, covers all of the red meats.

I call attention to that to show that not only is livestock production a big part of agriculture but our Bureau covers practically the whole field of livestock production except the breeding and management work with dairy cattle.

I think that covers the statement I want to make in opening. If you want to proceed with the budget, as we have in the past, we will be glad to do so.

Mr. ANDERSEN. We will have further general discussion first, Doctor.

Dr. SIMMS. We will always be glad, of course, to answer any questions.

HOG CHOLERA

Mr. ANDERSEN. Doctor, what are the latest developments relative to hog cholera?

Dr. SIMMS. We are making progress in the new vaccines for the control of hog cholera. We are making progress in the actual control of hog cholera in the country. I know the committee is more or less familiar with the new vaccines that have come out.

The first of these were produced under license some 16 to 18 months ago now. They are selling roughly a million doses of hog-cholera vaccines monthly, 12 million doses annually. We are vaccinating 45 million to 55 million hogs in the country, all told, each year.

Losses from hog cholera during the last 12 months have been quite low, but this is still an expensive disease. When we say we vaccinate 45 to 55 million hogs a year, that means, of course, the production of the vaccine, its cost, and the time and trouble it takes to vaccinate the hogs. We like to think that, somewhere in the future, we will eradicate hog cholera so we will not need to vaccinate against it.

Canada does not tolerate hog cholera, and neither does Australia, nor England. They live without the disease. They do not have to go to the expense of vaccinating the hogs.

While I would say our present procedure is holding losses down quite low, the disease is still costing us a minimum of $40 to 50 million a year in vaccine production and the administration of the vaccine, and we are still having a fair number of hogs die from the disease. But we are looking forward to the time when we can put on an eradication program and live without it. That is what we would like to do.

Mr. ANDERSEN. Have you made a study, Doctor, as to the cost of such a program?

Dr. SIMMS. We have put some marks on paper, yes. We think we would need to start with a pilot experiment or pilot area and take, say, 8 or 10 or 15 counties to see what it would cost in that area before we could come up with any firm figures.

ANIMAL HUSBANDRY

Mr. ANDERSEN. Doctor, you have discussed problems in general, but I think you should enlarge your opening statement to bring out the accomplishments under animal husbandry for the record.

Dr. SIMMS. Dr. Byerly is here, who is in charge of the Animal Husbandry Division. I would like him to give a bird's-eye view of the project.

Mr. ANDERSEN. Doctor, I would like you to discuss that work at this point.

Dr. BYERLY. Our general objective, of course, maintained from year to year, is to get more and better animal products from the available amounts of feed, because we all know, our feed supplies are relatively limited.

We know that animal conversion from feed to food is roughly of the nature of 5 to 1, so that we need to improve the efficiency by every means that we can.

Now, in order to improve efficiency, the beginning point is the genetic capacity to produce new products.

We have several large breeding programs in cooperation with the States. One among those is the beef cattle breeding program operated in cooperation with 37 States and the Territory of Hawaii. Our problem there is to increase the rate of gain and with it to increase the efficiency of meat production.

CATTLE

The efficiency of feed conversion of beef cattle is, as far as growth is concerned, about the same as that in any other class of animals, but it takes about 2 tons of digestible nutrients to support a cow for a year. If the cow produces one calf a year, and the calf weighs 400 pounds when weaned, it will cost almost 10 pounds of cow feed per pound of calf produced at that time. If we can wean a 500-pound calf, we reduce the cost by 2 pounds.

If we can assure a calf yearly from every cow instead of 80 percent, which is about what we do have, we will have still further improved our efficiency.

The genetic capacity of the cow to grow is transmitted in fairly high degree to her offspring. We are testing bulls for their performance and testing their steer half-brothers for their performance so we can improve the rate of gain.

There is a large amount of variation in the rate of gain. Some will gain at the rate of 1 or 1½ pounds a day and others at 2½. Much of this variation is due to inherited characteristics. So we have this test in cooperation with the States, in which we are seeking to improve the rate of gain.

There is another factor which at the moment is troublesome to us and in which I feel we are making very good progress.

The cattlemen in trying to please the housewives' preference for small cuts have tended the last few years to produce a good many small type cattle. Unfortunately, in all of our beef cattle breeds, the selection for these small type cattle has been accompanied by dissemination of the factor of dwarfism.

Now, dwarfism is no good to anybody. It shows up in all of our breeds. Our problem is one of identifying the carriers of dwarfism and eliminating the factors for dwarfism without destroying the factors we want to keep.

We are seeking the cooperation of breeders, and there is a new gadget that Paul Gregory of California has developed that may help us considerably in identifying these carriers. There is a bump on the head of the carrier bull that helps to identify it. You cannot go out and look at the bull and say, "This is a dwarf carrier," but you can, by running profile with this gadget and making a few computations on it, decide with fairly high degree of accuracy, as far as we know, whether this bull will transmit dwarfism to his offspring.

This program is a big program, a growing program, and a most important one from the public standpoint.

We think the most difficulty lies in finding ways of getting calf crops up near the 100 percent level. Here is a very tough problem—the physiology of reproduction. We know the breeding season is short, covering only 2 or 3 heat periods. If the bull happens not to be any good, you may not know it before the breeding season is almost over. We need ways of identifying bulls to do that job for us.

We know that some cows may not conceive at first service, may skip and come back next time. We are only beginning to gain information on that. That gets into such specialties as vibriosis and leptospirosis.

Basically, we have a nutritional problem, too, with respect to when the cows will reproduce. We do not fully understand that sort of thing.

Areawise there are wide variations. In the southern Great Plains, for example, we can keep cows through the winter that will lose quite a lot of weight, look like shadows, and still go on breeding, and have a 90 percent calf crop. If we move into the southeastern sandy coastal plain areas, where they have wire grass, cows losing the same amount of weight produced only every other year or every third year.

It is not simply a matter of weight; something else is deficient in the background of those cows. When they are kept up on weight with cottonseed cake supplementation, we have heavier cows and wean heavier calves, but so far over a 5-year period we have only raised the calf crop by about 5 percent, and we are not yet sure whether that is real.

So we have a problem of reproduction there.

POULTRY

Now in another area, we have a similar project with poultry in which we are cooperating with a number of States. In the western region, we are cooperating directly with 5 States on the problems of turkey fertility.

One of the problems, production of heavy turkeys, especially, is the low rate of hatching. This is largely due to the fact that fertility is low. Work at Washington State in cooperation with this program has indicated that if you take toms and warm them, keep them in a warm place a month before the breeding season, you can materially increase the fertility of the eggs and help to drop poultry costs and

production costs so the turkey breeders will be able to compete at a lower price.

In the north-central region, the poultry breeding project is addressed primarily toward egg production, and here a dozen States are cooperating in the development of inbred lines, and through the central testing station located at Purdue, we are testing the combinations of these lines to form hybrids after the fashion of hybrid corn. Of course, hybrid poultry will not come as fast as hybrid corn. It does not show so many obvious advantages. We have the problem here of not throwing away the closed-flock breeding. Good breeders have been using closed-flock breeding for years and doing very well. We need to keep that and to add to it any advantages that may accrue in developments from hybrid lines. Some of our best inbred lines from the standpoint of combining values show up very well.

One in Nebraska shows up very well after a year or two of testing. Two lines at Beltsville showed up in exactly the same way, and in Minnesota there is a very excellent program that is a part of this general program in the development of inbreds and hybrids. It is one of our strongest components of the north-central program.

In the southern region the emphasis is shifted, naturally, more to the production of meat-type chickens. This program is being handled by young, aggressive men who are employees of the cooperating stations. They hope through their own devices to get industry cooperation for the development of the program and central testing station. They hope to get money for that central testing station from private sources. Of course, if they can do it that will be fine, and they have rather good prospects of doing it.

SHEEP

Our regional sheep-breeding program is centered at Dubois, Idaho, where we work in cooperation with the 11 Western States and Texas. Here our objectives are to try to combine in one sheep, either through crossbreeding combination or through pure breeding of sheep, a fine, heavy fleece of good merchantable quality and full and heavy lamb production.

We have developed during the last 30 years, I believe, Doctor, the Columbia, which is a very popular sheep in the northern range and is moving into the Farm Belt too. It is a big sheep which produces big lambs with heavy fleece. The only fault, I think, about it is the lambs are a little heavier than preferred market weight when they reach market finish.

This sheep is a derivative from the Lincoln and Rambouillet. The original crosses were made some thirty-odd years ago.

Due to the fact that this sheep was a little big for some purposes and its wool was on the medium side, they took another shot of Rambouillet and put it in it a few years ago and made what is known as the Targhee. The Targhee has a little finer wool. It is a very popular sheep. It is growing fast. It has a very good wool, not quite so fine as the Rambouillet.

The Rambouillet is the basic sheep for the whole western country, and about half our sheep population at the Dubois station is Rambouillet.

We are endeavoring to improve the fleece weight, fiber length, and lamb production and lamb weight of the Rambouillets. We know, of course, that we will reach ceilings in what we can do in applying our present knowledge with these sheep. We must go on to gain more basic information so that we can through better genetic knowledge break through our ceilings on wool production and lamb production. So a major portion of the work at Dubois is of a basic sort.

POULTRY DISEASE

We are carrying on another regional program with poultry that involves the 25 Northeastern States. This program is a hybrid program and involves disease and breeding research. The program is for the study of viability in poultry. It is operated at the Regional Poultry Laboratory at East Lansing, Mich. The work of that laboratory is centered on avian leukosis.

Avian leukosis is the major cause of loss in laying flocks in the United States. Depending on the price of fowl, the direct monetary loss from this disease in the United States varies between $50 and $100 million a year. The disease is similar to cancer in man. It is a transmissible neoplastic disease of the blood.

The transmissible agent is similar to a virus. The disease is transmitted very quickly among young chicks soon after hatching, and when they are exposed to older affected stock during that time, heavy losses on the order of 2 to 5 percent of layers per month will follow.

Mr. ANDERSEN. How much did you say was the annual loss from that?

Dr. BYERLY. Between $50 and $100 million a year.

This disease can be transmitted through hatching eggs. We are not sure how important egg transmission is. I think it is a sort of seeding process. I think an occasional chick that hatches has the disease and serves as a means of infecting the other chicks raised with it.

We know, too, that there are environmental factors affecting the spread of the disease, because from the same hatchery, from the same breeding flock, different flocks of chicks sold to different people, one of them will have heavy incidence of disease and the others very little.

We do not know what these environmental factors are aside from exposure to other infected older stock. But even in the absence of such exposure, there is a wide variation there and a problem there we have not been able to lick.

We do know from the breeding standpoint that we can breed stocks that are resistant or nonsusceptible to this disease, and our present hope is that we can breed economically sound stock that are genetically resistant to avian leukosis.

This in my opinion is an expedient. That we breed for resistance is an important thing. The very best we can do in the absence of a solution to the basic problem, which is prevention of avian leukosis.

Now perhaps someday we will have a diagnostic test, and we are working toward that in our research so we can tell the apparently healthy bird that is carrying some sort of contamination. We do not have that yet. We are working on it and trying to find it.

As for a cure, we will, of course, keep looking. We do not expect to find a cure for this disease. We do hope to find a preventative. We do not know why the disease is spread, we only know how it may be transmitted, and are ignorant in many fields of that.

SWINE BREEDING

Our other large regional project which deals with breeding is our swine-breeding project. Beginning in the 30's in the North Central States, we started, in cooperation with all the North Central States, a regional swine-breeding program.

It has two purposes: first of all, to determine the basic information with respect to the inheritance of economic factors in swine; and, second, to develop lines of swine that are superior to serve as lines in combination for the production of pork.

We have made very excellent progress from the standpoint of the basic information, and during the last 3 years have made very good progress in finding lines that combine well.

The basic problems here are to get a pig that will wean a lot of youngsters, that will grow fast and utilize corn efficiently, that will come to market without too much fat, and that will yield a high percentage of dressed carcass when it comes to slaughter.

Here we meet some difficulties because the pig that grows fast is by and large the fatter pig. The meat-type pig is generally the slow growing pig.

It is not necessarily so. In the Regional Swine Breeding Laboratory and at Beltsville, we have used the Landrace in combination with other breeds to develop these types of swine. We have lines and combinations which grow rapidly and yield a high percentage of carcasses that are not too fat. It is possible to substitute lean meat for fat, but it is not easy. We do not have a lot of these pigs.

This problem, in my opinion, is one of the major problems in the whole animal-husbandry field, not only from the standpoint of research but from the standpoint of the application. There is no breed of pigs, so far as I know, that does not contain lean stock. All breeds contain the genes necessary to produce pigs of this sort. It is a problem of finding them, identifying them, and maintaining the lines and combinations which will produce meat for our people without the excess of lard with which we are blessed. It is a very tough problem.

LARD AND PORK PRICES

Mr. ANDERSEN. Doctor, we have previously in these hearings gone into the fact that it is the accumulation of lard that presents the problem as far as hog prices are concerned.

Dr. BYERLY. That is right.

Mr. ANDERSEN. And that leads directly into the field which you are describing at present—the need to develop hogs which produce less lard in proportion to meat.

Dr. BYERLY. That is correct, but not only produce less lard, they must grow as fast as any pig, yield as large litters as any pig, and yield as large carcass as any pig.

Mr. ANDERSEN. Why not go back to the old Tamworth and Yorkshire? I produced in those years, if I recall rightly, a 240-pound Yorkshire in a 6-month period, as well as Tamworth or Poland China.

Dr. BYERLY. Yes, sir; and many individual farmers do exactly that. By and large, however, under Corn Belt conditions, our farmers have not been successful in getting as good growth rate out of them as other breeds of pigs.

In some sections, such as Michigan, they are very popular.

Growth rate is what they are most often deficient in, although there are a couple of other minor defects. For example, there is some trouble from hernia and blind teats in the Yorkshire; but such troubles can be readily handled.

The Tamworth is a very good pig. As a matter of fact, the Tamworth in combination with Landrace gave rise to a popular pig, Minnesota No. 1, with which you are familiar.

Now the actual problem then is one that moves on. It moves on rather slowly, sometimes more slowly than we wish for, but it is a soluble problem.

The interest in this problem varies with the difference in price of lard to the price of live hogs. Just now lard is about half the price of live hogs, so the interest is very considerable. If it comes up to the price of live hogs, the interest will die very fast.

Mr. ANDERSEN. Does that complete your statement?

Dr. BYERLY. As far as our regional programs are concerned.

SHIPPING FEVER

Mr. MARSHALL. Doctor, what are you doing in connection with the control of shipping fever?

Dr. BYERLY. I am not in charge of that. Dr. Simms will answer that.

Dr. SIMMS. The answer is we are not doing as much as we would like to do. Shipping fever is a serious disease of cattle causing a large amount of loss, just as you indicated. It is spread to a very considerable extent by the movement of the animal from one place to another, whence it derives its name.

We have done some work with it. We attempted to find a medicinal treatment. These attempts were largely unsuccessful.

We attempted some 20-odd years ago to find a vaccine. I think the most we can say for the vaccine is that it has been disappointing. I would not say it has not given some results, but surely not very good results.

In our quarantine work we attempt to control the movement of animals that actually have the disease, but such attempts are very unsatisfactory because in the early stages of this disease, as is true of many other diseases, you cannot always see the animal is affected although it may be a very active spreader of the infection.

Consequently, when we bring a group of animals to a sales barn or stockyards it may be impossible to see that any of them are actually sick. But after 24 or 36 hours, they may develop symptoms; by then the disease will be spreading very quickly to the other animals that come in contact with them.

Mr. MARSHALL. Dr. Simms, does that same lung condition affect hogs?

Dr. SIMMS. Not this same disease. Shipping fever of cattle is not transmissible to other domestic animals.

You realize, of course, insofar as disease control programs are concerned, the Bureau of Animal Industry has no authority within a State. Out authority covers only animals crossing State lines. So if there is a sales barn or sales yard within a given State and the animals are sold to move from that barn within that State, then it is the State veterinarian or State sanitary board that has control; our controls are exercised only when the animals move across State lines.

Mr. MARSHALL. However, the affected animals, as far as Minnesota is concerned, are those animals which largely move across State lines?

Dr. SIMMS. Yes; the disease comes into Minnesota with animals shipped from the outside. We know that, and we know that it goes out from these sales centers to the farms. But this is one of the diseases that we just do not have a good method of controlling.

As I said, we have done some research with it. We hope that we can do some more in the future.

Dr. BYERLY. May I inject one comment there? One difficulty of this disease is that at the point of origin the animals in many cases appear to be perfectly healthy.

Dr. SIMMS. Yes; when the animals are loaded, say, in Wyoming or Colorado to go to South St. Paul, they will be perfectly healthy looking animals.

Mr. MARSHALL. Do you have any data that shows the amount of loss in dollars?

Dr. SIMMS. We do not. There have been a good many guesses made, but we have no figures that are accurate on it.

TUBERCULOSIS AND BRUCELLOSIS

Mr. ANDERSEN. Will you or one of your staff discuss the progress in the elimination of tuberculosis and brucellosis?

Dr. SIMMS. Yes; I will discuss that with you whenever you wish.

Mr. ANDERSEN. I think we might take it up right now.

Dr. SIMMS. We are continuing to make progress in the control and eradication of both of these diseases.

In our tuberculosis eradication program last year, we tested, in cooperation with the States, a little over 9 million head of cattle, and the number of reactors found was just a little over 10,000, or a percentage of only 0.11. That is the lowest that tuberculosis in the country has ever been. It has shown a constantly downward curve since the end of the war.

We were winning up until the war started, but during the war years the percentage increased because of two factors: in the first place we lost a lot of our veterinarians; and in the second place there was a great deal of movement of cattle back and forth from farm to farm. But at the end of the war the percentage started down again, and now it is down to the lowest point that it has ever been.

Mr. ANDERSEN. Were these 9 million tests of tuberculosis that you conducted on cattle pretty well scattered all over the United States?

Dr. SIMMS. Yes.

Mr. ANDERSEN. Are they spot checks or spot tests?

Dr. SIMMS. They are spot tests except in areas where the disease shows some indication of increasing, or where the percentage runs fairly high. Then we test an entire area and retest on a calendar basis. The entire United States is now on what we call a modified-accredited-area basis, and we retest on a county basis every 3 years or every 6 years, depending upon the setup.

If you would be interested, here is the record by States.

Mr. ANDERSEN. I think it would be very well to put that table in the record at this point.

Dr. SIMMS. In the State of Minnesota, for instance, last year 608,000 animals were tested, with 189 reactors, or 0.03 percent.

(The table referred to follows:)

Record of tuberculin testing, cooperative tuberculosis eradication work, fiscal year 1952

State [1]	Herds tested	Cattle tested	Reactors found	Percent reactors	Infected premises
Alabama	1,838	46,976	67	0.14	28
Arizona	1,162	15,034	19	.13	9
Arkansas	2,537	35,814	1	.003	1
California	21,018	750,427	1,054	.14	292
Colorado	2,517	37,841	15	.04	14
Connecticut	8,243	177,907	123	.07	54
Delaware	2,134	46,327	54	.12	39
Florida	3,660	90,331	50	.06	12
Georgia	3,184	99,829	112	.11	21
Idaho	2,529	43,255	6	.01	4
Illinois	31,086	545,084	1,009	.19	520
Indiana	28,090	396,800	880	.22	532
Iowa	22,269	461,740	687	.15	511
Kansas	11,090	185,444	108	.06	65
Kentucky	1,962	37,261	41	.11	23
Louisiana	618	24,833	121	.49	16
Maine	7,580	71,743	26	.04	19
Maryland	10,523	225,290	151	.07	96
Massachusetts	11,530	190,632	147	.08	41
Michigan	11,629	190,887	731	.38	448
Minnesota	31,229	608,796	189	.03	111
Mississippi	3,117	60,151	5	.008	3
Missouri	10,517	164,006	80	.05	33
Montana	1,137	21,234	1	.005	1
Nebraska	4,953	80,558	56	.07	38
Nevada	141	3,801	1	.03	1
New Hampshire	7,805	105,356	13	.01	4
New Jersey	12,671	237,082	236	.1	131
New Mexico	954	15,718	9	.06	9
New York	40,921	1,167,108	1,272	.11	399
North Carolina	6,872	90,522	23	.03	4
North Dakota	941	19,537	19	.1	10
Ohio	37,187	446,741	640	.14	589
Oklahoma	4,676	133,605	42	.03	23
Oregon	22,924	189,896	75	.04	33
Pennsylvania	29,882	486,181	742	.15	241
Rhode Island	1,036	24,971	23	.09	20
South Carolina	3,131	49,094	17	.03	9
South Dakota	3,883	88,398	171	.19	61
Tennessee	2,662	61,877	155	.25	30
Texas	3,815	133,045	193	.15	58
Utah	5,741	39,161	44	.11	42
Vermont	6,882	187,468	89	.05	18
Virginia	9,602	175,354	77	.04	39
Washington	4,777	51,025	79	.15	28
West Virginia	2,830	48,570	10	.02	5
Wisconsin	26,165	668,677	547	.08	194
Wyoming	339	4,284	12	.28	6
Hawaii	534	21,294	68	.32	27
Puerto Rico	16,216	107,300	61	.06	27
Total	488,769	9,164,265	10,351	.11	4,939

[1] The District of Columbia is not shown in this tabulation since there are no longer any cattle under supervision for the eradication of tuberculosis there.

Field Organization

Mr. Andersen. Doctor, describe your field organization briefly. That does not have reference simply to tuberculosis and Bang's disease, but your entire field organization?

Dr. Simms. Our field organization in the disease-control program, consists of a unit in practically each one of the States. Some of the smaller States we combine; for instance, Delaware and Maryland are combined in a single field office in Baltimore. But, in general, we have a field representative in each State.

This office is in charge of one of our Bureau men, always a veterinarian, and he works in cooperation with the State officials in his State in the control and eradication of diseases.

Now the principal job for the last several years has been brucellosis and tuberculosis, so some people think that our fieldman is doing brucellosis-tuberculosis work only, but as a matter of fact, he is our representative, and we hold him responsible for information on programs in connection with any of the diseases that might occur or might appear in the area.

FEDERAL-STATE COOPERATIVE PROGRAM

The disease-control programs within the States are, of course, cooperative. We do not want it any other way.

The question is raised with us sometimes—"Well, wouldn't it be better if you had the same thing that you have in Canada where the Federal Government does all of the disease-control work? It has full authority."

We would rather have it like it is now—the State having the authority for the disease-control work and our people working in cooperation with them.

In the States our men are deputized by the State. As State deputies, they have the authority to quarantine. But our employees have no Federal authority to quarantine within any State; it is only when the livestock cross State lines that we can quarantine them.

These cooperative programs, such as brucellosis and tuberculosis eradication, sheep-scabies eradication, and so on, are supported by State funds as well as by Federal funds.

Mr. Andersen. Complete the answer to my question as to your field organization, Doctor.

Dr. Simms. Well, the work in the State is under control of a representative of the Bureau who is usually located in the same place as the State official, and then working under him, we have representatives who cover the different parts of the State.

As I said, the work is cooperative. The State veterinarian and the Bureau veterinarian map the work out together. In a good many instances we will have a man stationed, we will say, in one corner of the State, and he will have immediate supervision over both our employees and the State employees that are working in that section. In another area, perhaps a State man will be in charge, and he maps out the work. We divide a State into districts and have a district supervisor, and then under him are the men in the field doing the control work.

Mr. ANDERSEN. How many people do you have connected with the Bureau of Animal Industry in each State?

Dr. SIMMS. We will vary all the way from a small number, as small as 5 veterinarians, in some of the States, up to 18 or 20 in the States that have the largest number.

Mr. ANDERSEN. Is a table on this included in the material inserted in the record previously?

Dr. SIMMS. I do not believe so.

Mr. ANDERSEN. Perhaps you can break it down and put it in the record at this point by States.

Dr. SIMMS. We have it, and it will be no trouble at all to put it in.

(The table is as follows:)

Bureau field organization and staffing by States and Territories, Jan. 31, 1953 [1]

State	Animal research [2]		Animal disease control and eradication [3]								Meat inspection		Total	
			Cooperative disease control and eradication		Public stockyards		Import-export		Virus-serum control					
	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other
Alabama	1	17	[4] 11	[4] 6	[4] 1	[4] 1					5	4	18	28
Arizona		3	[4] 8	[4] 3	[4] 1			[4] 14			1	5	10	25
Arkansas			[4] 12	[4] 13									12	13
California		13	23	4	1	2		4	1		76	139	101	162
Colorado	2	44	[4] 9	[4] 11	[4] 3	[4] 4			2	1	18	43	34	103
Connecticut [5]											4	6	4	6
Delaware [6]												1		1
District of Columbia (field service only)											3	13	3	13
Florida		9	[4] 14	[4] 8			[4] 1	[4] 3	1		2	7	18	27
Georgia		5	[4] 11	[4] 4							15	43	26	52
Idaho		23	[4] 9	[4] 1							4	3	13	27
Illinois		1	16	6	9	24		1	2		47	233	74	265
Indiana		42	[4] 8	[4] 7	[4] 3	[4] 2					21	79	32	130
Iowa	3	40	13	12	4	4			6	9	46	227	72	292
Kansas			[4] 4	[4] 2	[4] 2	[4] 1			11	10	27	104	44	117
Kentucky			8	3	1	2					4	19	13	24
Louisiana		8	10	15	2	1		1			3	12	15	37
Maine			5	19			1	6				1	6	26
Maryland	11	275	[4] 12	[4] 23	[4] 1			[4] 2			12	37	36	337
Massachusetts			[4] 9	[4] 5				[4] 2			12	54	21	61
Michigan	1	31	[4] 17	[4] 5	[4] 1		[4] 3	[4] 4			9	24	31	64
Minnesota		2	21	26	4	9	1	6			29	149	55	192
Mississippi			[4] 13	[4] 10									13	10
Missouri			9	4	5	11			5	5	36	186	55	206
Montana		15	[4] 6	[4] 4	[4] 1		[4] 2	[4] 13			3	3	12	35
Nebraska		4	6		5	9			5	7	26	161	42	181
Nevada			[4] 4	[4] 1									4	1
New Hampshire [7]											2	1	2	1
New Jersey			6	4							16	29	22	33

See footnotes at end of table, p. 538.

Bureau field organization and staffing by States and Territories, Jan. 31, 1953 [1]—Continued

State	Animal research [2]		Animal disease control and eradication [3]								Meat inspection		Total	
			Cooperative disease control and eradication		Public stockyards		Import-export		Virus-serum control					
	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other	Veterinarians	Other
New Mexico		12	7	3	1	1							8	16
New York	2	10	10	7	2	4	6	39	1	1	40	158	61	219
North Carolina		4	[4] 11	[4] 2							2	3	13	9
North Dakota			[4] 9	[4] 12	[4] 1	[4] 1	[4] 1	[4] 15			9	16	20	44
Ohio		1	16	9	2	2			5	1	34	101	57	114
Oklahoma		3	[4] 6	[4] 3	[4] 3	[4] 4					9	37	18	47
Oregon			19	8	1			1			12	19	32	28
Pennsylvania		2	8	11	1	1		2			29	80	38	96
Rhode Island [5]											3	18	3	18
South Carolina			7	2							1	3	8	5
South Dakota			[4] 8	[4] 1	[4] 1	[4] 2					9	39	18	42
Tennessee		3	7	2	3	3					18	43	28	51
Texas	2	6	6	51	10	11	5	20	2	1	37	88	62	177
Utah	1	2	[4] 8	[4] 3	[4] 2	[4] 2					6	11	17	18
Vermont			5	4			1	7			3		9	11
Virginia		12	8	4	1			1			9	32	18	49
Washington		3	22	8	1	1	3	9			15	36	41	57
West Virginia			[4] 6	[4] 5								1	6	6
Wisconsin		7	[4] 10	[4] 25					1	1	22	80	33	113
Wyoming			[4] 2	[4] 2									2	2
Alaska		3												3
Hawaii											1	1	1	1
Puerto Rico			[4] 12	[4] 22								1	12	23
Total	23	600	451	380	73	102	24	150	42	36	680	2, 350	1, 293	3, 618

[1] Full-time employees.
[2] Includes employees paid from "Research facilities" and allotment from "Agricultural Marketing Act."
[3] Includes employees paid from "Eradication of foot-and-mouth disease and other contagious diseases of animals and poultry," "Expenses, feed, and attendants for animals in quarantine," and "Inspection of animal foods."
[4] Offices combined under 1 State organization.
[5] Animal-disease control and eradication work combined with Massachusetts office.
[6] Animal-disease control and eradication work combined with Maryland office.
[7] Animal disease control and eradication work combined with Maine office.

PERSONNEL REQUIREMENTS FOR MEXICAN BORDER INSPECTION

Mr. ANDERSEN. Why should the organization pattern in Arizona differ from that in other areas along the Mexican border, Doctor?

Dr. SIMMS. The pattern of the organization along the Mexican border is determined to some extent by the amount of work to be done in the States along the border; by the personnel and their availibility; by the numbers of animals that come in; and by the type of work that needs to be done.

Along the Arizona border, for instance, we are not concerned to the extent that we are along the Texas border with the importation of animals that might be tick infested, so that the type of inspection that is done there may be less burdensome and the amount of inspection is not as large as it is in Texas.

Mr. ANDERSEN. Now, from a report that I have, it seems that the Arizona arrangement has the advantage of closer coordination and supervision of the three general activities, border inspection, stockyard inspection, and tuberculosis and brucellosis work.

Dr. SIMMS. That is right. In Arizona, the border work is not as heavy as it is in Texas, and we have a single man in the State who has charge of all of the work.

Mr. ANDERSEN. Why do you not apply the same plan to New Mexico and Texas, Doctor? I am just wondering why you do not extend the benefits of the better organization in Arizona, as it looks to me, to New Mexico and Texas.

Dr. SIMMS. Well, the job in Texas is big enough so that the border inspection work really makes up a much larger segment, or a much bigger job, than it does in Arizona.

DISEASED HORSES

Mr. ANDERSEN. Doctor, last year the problem of handling diseased horses along the border was brought to the committee's attention. What has happened on this problem?

Dr. SIMMS. I believe they have worked that out reasonably satisfactorily. You remember that these horses were coming across the border and were apprehended on this side. The customs personnel were not very much inclined to seize the animals and sell them because they could not get enough money for them to pay for the handling. Since that time it has developed that the customs people are handling those horses, they are seizing, and selling them; and the thing is paying its way.

You remember when Mexico had foot-and-mouth disease, we had the authority to kill cattle that came in. We did not have the authority to kill these horses. In many instances the Mexicans would not come over and pay the impoundment charges on them, so the customs people just did not want to handle them. But that has been pretty well straightened out.

Mr. ANDERSEN. I understand the customs people, however, are doing a little complaining about this. Do you think that the arrangement will continue to work satisfactorily?

Dr. SIMMS. Yes, I think they have worked it out fairly well.

VESICULAR EXANTHEMA

Mr. HORAN. When will Dr. Simms be prepared to discuss this problem we have with the interstate shipment of VE swine?

Mr. ANDERSEN. We can go into that now, if you wish.

Dr. SIMMS. I am prepared to discuss it any time.

Mr. HORAN. The shipper may get clearance when he loads the swine at the f. o. b. point, but frequently they get sick en route and arrive at the packing plant infected. Of course, the animals have to be disposed of, and there has been quite a loss of money to the buyers from animals which were presumably healthy when they were loaded.

Dr. SIMMS. That is more or less similar to what we were saying just now about shipping fever in cattle.

Mr. HORAN. That is right.

Dr. SIMMS. The animals are loaded looking healthy, with no indications of the disease, but they arrive at their destination with acute, well-developed symptoms of vesicular exanthema.

That has been happening particularly with the hogs that have gone from Missouri River and Mississippi River points to the Pacific coast, where they are en route as much as 4 to 5 or even 6 days. It has been a very troublesome problem. It is one that we have not solved as yet.

INDEMNITY PAYMENTS

The States that have received these hogs have naturally, I think, been rather reluctant to pay indemnities on them. They say these hogs originated in Omaha or South St. Paul or Kansas City and arrived in California or Washington or Oregon with this disease; that it is not up to them to pay indemnities on animals that have contracted disease somewhere else and have come into their State.

Our agreements with the States have been, and the procedure always followed in paying indemnities by the Bureau has been, a cooperative one; that is, the State pays part of the indemnity and the Federal Government pays part.

I might say that we have a conference set up for this afternoon for a discussion of vesicular exanthema and the payment of indemnities, but this is a problem that we have not as yet found a method of solving.

EXTENT OF DISEASE

Mr. ANDERSEN. What is the extent of this disease at present?

Dr. SIMMS. At the present time the disease is known to be in about 18 or 20 States. It has invaded, all told, since it spread from California last year, 36 States.

Mr. ANDERSEN. Have you any estimates as to the loss up to this time?

Dr. SIMMS. We have some figures as to the number of animals that have been infected and the numbers that have been slaughtered.

Mr. ANDERSEN. Of course, we know it has been in California for some years.

Dr. SIMMS. It has been in California for 20 years. Since the disease left California, up until the 28th of February it has invaded about 36 States. It has infected, all told, according to our figures

that we know of, somewhere around 170,000 hogs, excluding California and New Jersey.

Mr. ANDERSEN. Does that represent an almost total losss as far as the individual hog is concerned?

Dr. SIMMS. No. These hogs can be slaughtered. The ones that have the disease, of course, cannot be slaughtered and passed for human food, but the ones that have been exposed but show no symptoms are passed—in other words, put it this way: The disease shows up in a man's herd of hogs. He has a 100 hogs and maybe 20 of them have the disease. The other 80 that do not have the disease can go to slaughter. The carcasses are processed after slaughtering, that is to say, they are heated to a point where the virus will be destroyed if the virus is present, and then they go on the market for human food. The disease is not transmissible to the human. The heating is to destroy any virus that might be there, so if any pork got in the garbage, it would not spread to hogs fed that garbage.

DISEASE-CONTROL EXPENDITURES

Mr. ANDERSEN. How much have you expended to date on this particular disease?

Dr. SIMMS. Our total expenditures through February 28 are a little over $1,400,000.

Mr. BUTLER. That is the obligation figure through February 28.

Dr. SIMMS. It includes some hogs appraised but that have not been slaughtered yet, and does not cover all of it.

Mr. BUTLER. The $1,400,000 covers indemnities for hogs and material destroyed but does not include field expenses. That, as Dr. Simms indicated, is absorbed by Bureau from other animal disease control and eradication funds, principally through the Brucellosis and Tuberculosis Eradication Division.

CONTROL PROCEDURES

Mr. HORAN. You are working on new procedures here?

Dr. SIMMS. That is correct. We have drawn up a program that will be considerably more drastic than the one we are following now; one we hope will lead to the different States beginning to cook their garbage.

Mr. ANDERSEN. Do you think you are getting the upper hand on this thing?

Dr. SIMMS. I would say we have done nothing more than hold our own for the last 3 months. The disease has spread to a very considerable number of garbage-fed hogs in this period, As a matter of fact, we have not made any real progress since about the 1st of December. We have just about held our own.

SOURCE OF FUNDS FOR CONTROL EXPENDITURES

Mr. ANDERSEN. How much are you asking in the Budget for control of this work this coming year?

Dr. SIMMS. We are not putting it in a separate budget item. Our estimate is, however, that it will take two to two and one-half million dollars for the next year.

Mr. ANDERSEN. You are not asking for a separate appropriation for this?

Dr. SIMMS. The decision has been made that it can be taken care of in other ways.

Mr. ANDERSEN. As you did the foot-and-mouth disease?

Dr. SIMMS. Something along that line, yes.

Mr. BUTLER. Up to the present time it has been financed by transfers from other funds in the Department under authority given the Secretary in the 1953 Appropriation Act.

Mr. ANDERSEN. I understand that.

Mr. BUTLER. Funds in the Department apart from those of the Commodity Credit Corporation have been used.

Mr. ANDERSEN. I want to say for the record that you gentlemen did secure from this committee an O. K. as to those transfers last summer.

Dr. SIMMS. That is right.

Mr. ANDERSEN. But now continue as to what you propose to do relative to financing it in the future.

Mr. BUTLER. It is proposed that the program be financed the same way next year. I believe that is the proposal, that is, from other funds in the Department that are available for transfer.

Mr. HORAN. It is quite a problem, is it not?

Mr. BUTLER. It is difficult to program and estimate because of the uncertainties of the disease. We believe it is going to cost a minimum of $2 million next year.

Mr. ANDERSEN. We certainly do not want to encourage you to spend money that is not needed, but at the same time we want you to have money available to take care of a thing like that.

Mr. BUTLER. So far we have had the money that we need, Mr. Chairman.

Mr. ANDERSEN. The committee will stand in recess until tomorrow morning at 9:30.

TUESDAY, MARCH 10, 1953.

Mr. ANDERSEN. The committee will be in order.

Dr. Simms, I understand Dr. Fladness has been ill. How is he progressing?

Dr. SIMMS. Dr. Fladness has been ill. I think the best we can say is that he is gaining rather slowly.

Mr. ANDERSEN. We have been accustomed to having him sit across the table from us. We want him to know that we miss him and wish him a speedy recovery.

Dr. SIMMS. I know he will appreciate very much having a message from you.

Mr. HORAN. Convey my own personal respects to him. He has always been very courteous to me and we wish him well on his recovery.

Dr. SIMMS. He will appreciate that more than you realize because if there is any one thing that has helped it has been the messages that have come in from his friends and acquaintances. He has said, "I just don't deserve the good wishes that I have had."

WORK PERFORMED FOR OTHER AGENCIES

Mr. ANDERSEN. Doctor, what work do you perform from transfers and other funds available to your Bureau?

Dr. SIMMS. I believe we will ask Mr. Butler to handle those transfer funds, if he will.

Mr. ANDERSEN. I refer to the items on page 184 of the justification.

Mr. BUTLER. In 1953, Mr. Chairman, we have funds from the Department of Defense for work at the Fort Reno, Okla., station. That is simply a processing station for the Army, processing animals going overseas, and we are performing services for that Department in furnishing the labor and maintaining the property that is required in connection with it.

The item of $158,170 covers special projects of a classified nature that we have under way for the Department of Defense.

Those items constitute the major work that we are doing from funds of other agencies. There are some funds in 1953 from the Atomic Energy Commission that do not show here but rather as reimbursable work under "Salaries and expenses."

Mr. ANDERSEN. You also have a large sum of money for overtime meat-inspection services furnished packers and the Government agencies?

Mr. BUTLER. Yes. We do work for the Navy.

Dr. MILLER. We have conducted inspections to assure specification compliance for the Navy for many, many years. That has been part of our program for 25 or 30 years. Actually, most of that is carried over, even since the services have combined their inspection activities. We still perform most of the destination inspection for the Navy. We have never conducted inspections for the Army, however, as such.

Mr. ANDERSEN. We will go into that thoroughly later on, gentlemen. There has always been a question as to why the armed services have to do their own meat-inspection work instead of accepting the work done by the regular meat-inspection service. It seems to me there is a terrific amount of duplication there.

COST OF VESICULAR EXANTHEMA PROGRAM

Mr. ROBERTS. Mr. Chairman, before you leave the question of transfers, a statement was made at the close of the hearings yesterday afternoon, that led me to believe members of the committee perhaps thought we were advancing CCC funds to pay for the cost of vesicular exanthema eradication this year. I have a statement here, if the chairman wishes it to be placed in the record, which indicates the sources from which these funds are being transferred to finance the program this year. The funds used represent reserves and unused balances which examination has shown are not needed in other appropriations, and which under the authority available to the Secretary, have been transferred to meet this emergency. They total $2,108,000, and cover estimated needs through April 30.

Mr. ANDERSEN. We will insert that in the record at this point, Mr. Roberts.

(The statement referred to is as follows:)

VESICULAR EXANTHEMA

The cost of the eradication program for the 1953 fiscal year is estimated at $2,548,000. Transfers of $2,108,000 from existing appropriations within the Department have been made to cover estimated obligations through April 30, 1953, as follows:

	Amount
Federal Crop Insurance Corporation	$1, 052, 200
Control of emergency outbreaks of insects and plant diseases, Bureau of Entomology and Plant Quarantine	500, 000
Control of forest pests	172, 800
Salaries and expenses, Bureau of Animal Industry, animal-disease control and eradication	175, 000
Salaries and expenses, Soil Conservation Service	208, 000
Total	2, 108, 000

For the last 2 months of this fiscal year, it is estimated that $440,000 will be required.

SPECIFIC APPROPRIATIONS PREFERRED TO TRANSFERS

Mr. ANDERSEN. Is it not a dangerous policy on the part of the Congress to permit you people to do unlimited transferring when we know that a problem exists? As I stated yesterday, it seems to me you should ask for a specific allocation for that particular work, if you can possibly agree as to the sum needed for it. That would give to the Congress a more definite control of the work. I do not consider this to be the same problem as the foot-and-mouth-disease-eradication work; it is not that large.

Mr. ROBERTS. I agree with your statement, Mr. Chairman, that when you know you are going to have a program and can plan for it in your budget it is best to do it that way. As you know, this outbreak occurred after Congress adjourned last year.

Mr. ANDERSEN. You do not think you can give a good figure on it at this time?

Mr. ROBERTS. Yes; before these hearings are adjourned I think we will have some answer from the Bureau of the Budget on financial plans for 1954 which will enable us to make a proposal to this committee.

Mr. ANDERSEN. I wish you would do that. We will go on the assumption that we can always consider a supplemental next spring for that particular work, if necessary. I do not like to encourage you people to make transfers of this nature unless it is absolutely necessary.

Dr. SIMMS. This occurred after the adjournment of the Congress last year.

Mr. ANDERSEN. I approved of it at the time, but it is not in my opinion good appropriation practice as a regular thing.

Mr. BUTLER. Another item under supplemental funds on page 185, Mr. Chairman, is that of animal-foods inspection, the expense of which is entirely financed by the processors and packers of animal foods, principally dog foods. That is estimated at $112,000.

WORK OF INFORMATION DIVISION

Mr. ANDERSEN. And now, Dr. Simms, I wish you would describe the activities of your Information Division. What are the functions of the 10 people in that Division?

Dr. SIMMS. I will ask Mr. Butler to discuss that with you, too.

Mr. BUTLER. We have, as you say, the 10 people in the Information Division. Mr. McClarren is the Chief of the Division and gives general supervision to all the informational work within the Bureau. He has two principal assistants, one a GS–12, who reviews manuscripts and papers, principally, and another GS–12 who is in charge of the Editorial Section. He reviews publications and all materials before they are published or used.

There is one GS–11 in charge of our visual-information work, preparing visual-information material and charts and graphs for use in connection with the research and regulatory programs.

Another GS–11 works almost entirely on current information, as well as material that goes out to the press. There is a GS–9 editor and a GS–7 who assists in the visual-information work. A GS–5 assistant editor, a secretary, GS–5, and a correspondence clerk at GS–4 complete the staff.

Mr. ANDERSEN. Do you not think you are a little top-heavy in that particular Division? You have 3 GS–12's and 1 GS–11.

Mr. BUTLER. We have 2 GS–11's and 2 GS–12's. The Chief is a GS–14.

Mr. ANDERSEN. You have only one in grade 4?

Mr. BUTLER. That is right.

Mr. ANDERSEN. Do you not think there is a tendency toward too much upgrading here, Doctor?

Dr. SIMMS. I do not think we have upgraded beyond the responsibility of the jobs.

Of course, we are guided to a considerable extent in our promotions and recommendations along this line as to what the salary scale is and the programs in other areas in which these people might work and have worked.

Some of these people, for instance, here have worked in grades higher than those at which they are working for us now.

Mr. ANDERSEN. In response to my question, with respect to the Information Division, please extend your remarks so that we have a clear picture as to what each of these people do.

Mr. BUTLER. I will be glad to supply a statement.

(The information requested is as follows:)

DUTIES AND STAFFING OF INFORMATION DIVISION

The Information Division edits and assists in revising farmers' bulletins and leaflets of the Bureau and prepares practically all special informational reports, press and radio releases. These are issued through the Department's Office of Information. In addition, the Division provides answers to many public requests, in person, by phone, and letter. Other services include review of all scientific manuscripts submitted to technical journals, and assistance and advice in preparing many items of administrative nature.

The head of the Division, GS–14, carries these responsibilities for the Chief of the Bureau. As the one Bureau of the Government that deals with livestock and livestock diseases, this Division must furnish a great deal of specific information on request from the local press, and particularly from the farm press, farm radio directors, and trade journals interested in livestock problems. Direction is given to all phases of the information program and services to the various public-information media.

Besides the head of the Division, only one other position, a GS–11 information specialist, is assigned to reporting current information. Because of the many emergency disease problems faced in the past year, emphasis has been necessarily in this direction. Public notice is required by law in newspaper advertisements, but for wider dissemination of information, press releases are also prepared. As

a result, the Bureau has issued 36 such releases on emergency programs, while only 19 releases on research have been issued since July 1, 1952.

The Editorial Section, consisting of three positions, GS–12, GS–9, and GS–5, is responsible for editing all Bureau publications. Since July 1, 1952, the Bureau has issued 7 new publications, revised 16 farmers' bulletins and leaflets, and has lent assistance on special reports prepared in other sections of the Bureau.

Another technical editor, GS–12, is assigned to the review of scientific manuscripts published in technical journals. A total of 180 such manuscripts has been reviewed since July 1.

The Special Reports and Visual Section has two persons, a GS–11 and a GS–7. This Section works with the editorial group in illustrating publications, providing a limited photographic service to the farm press, and prepares materials for use in motion pictures, exhibits, and other visual media. This Section also spends a large amount of time lending assistance to scientists in preparing charts, graphs, photos, and other visual materials for presentation in technical journals. Special reports, while falling nominally in this Section, often require the services of all sections, including the head of the Division. These include such items as "Developments on Vesicular Exanthema," "Raw Garbage Spreads Livestock Diseases," and special training materials for Bureau personnel engaged in emergency disease programs.

One GS–5 secretary and one GS–4 correspondence clerk complete the staff of the Information Division. Most of the routine requests for information, which can be answered by publication, are handled in this Section.

ADMINISTRATIVE ACTIVITIES

Mr. ANDERSEN. Discuss the work of the 39 people in the Personnel Division, the 66 in administrative services, and the 141 in the Budget and Fiscal Division. I want a rather complete discussion in the record at this point.

(The information requested is as follows:)

PERSONNEL DIVISION

(Employment, February 28, 1953)

1 GS–13 personnel officer, in charge
1 GS–5 secretary

CLASSIFICATION AND ORGANIZATION SECTION

Classifies positions in appropriate grades and class series in accordance with the Classification Act of 1949; develops new or improved organizational plans and operating methods; administers program governing compensation of personnel occupying positions not subject to the Classification Act.

1 GS–12 position classifier
1 GS–9 position classifier
2 GS–7 position classifiers
1 GS–5 clerk
1 GS–3 clerk-typist

EMPLOYMENT SECTION

Carries out recruitment, selection, appointment, placement, qualification, transfer, promotion, separation and related personnel programs; administers Bureau-wide career-service program; interprets regulations on leave and retirement.

1 GS–12 placement officer
2 GS–11 placement officers
1 GS–9 placement officer
1 GS–7 placement officer
3 GS–5 appointment clerks
1 GS–5 secretary
1 GS–5 personnel clerk
1 GS–4 appointment clerk

TRAINING, RELATIONS AND SAFETY SECTION

Conducts training programs to equip personnel for more effective job performance; conducts comprehensive programs for improving employee-supervisor relations; conducts accident-prevention and safety programs.

1 GS–11 training officer
1 GS–7 training assistant
1 GS–5 employee-relations assistant
1 GS–4 clerk-stenographer

INVESTIGATIONS SECTION

Conducts investigations of alleged misconduct, fiscal irregularities, theft, discrimination, and other violations of Federal statutes or Department regulations; determines appropriate disciplinary penalties; recommends policies and standards for employee discipline.

1 GS–12 investigator
1 GS–11 investigator
1 GS–7 investigator

PROCEDURES AND SERVICES SECTION (RECORDS, REPORTS, AND SERVICES)

Coordinates interpretation and distribution of policy and procedural instructions of the Bureau, Department, Civil Service Commission, etc.; maintains personnel and classification records; compiles personnel reports.

1 GS–9 personnel assistant (procedures)
1 GS–7 personnel technician
1 GS–5 clerk (reports)
1 GS–4 clerk (compensation)
3 GS–4 appointment clerks
1 GS–4 mail and file clerk
2 GS–3 file clerks
1 GS–3 mail clerk
1 GS–3 clerk-typist

CIVIL SERVICE BOARD OF EXAMINERS, DALLAS, TEX.

Provides clerical assistance to cover Bureau's share of expenses incident to operation of civil-service boards of examiners for the Department of Agriculture.

1 GS–4 clerk

ADMINISTRATIVE SERVICES DIVISION

(Employment Feb. 28, 1953)

1 GS–13 administrative officer, in charge
1 GS–6 secretary

CONTRACTING AND PURCHASING SECTION

Procures equipment and supplies; prepares specifications and invitations to bid for supplies and equipment, purchased or sold, in excess of the open-market limitation, and awards contracts up to $10,000 for purchases and $5,000 for sales; prepares orders for printing and binding, miscellaneous publications, reproduction and distribution services.

1 GS–12 administrative officer, in charge
Purchase Unit:
1 GS–9 purchasing assistant
1 GS–7 purchasing assistant
1 GS–3 clerk-stenographer
1 GS–3 clerk-typist
Printing and Duplicating Unit:
1 GS–7 administrative assistant
1 GS–5 printing and publishing clerk
2 GS–3 clerk-typists
Contract Unit:
1 GS–9 procurement officer
1 GS–5 clerk
Control and Reports Unit:
1 GS–7 administrative assistant
1 GS–4 clerk

MANAGEMENT PROCEDURES SECTION

Controls and reviews all Bureau forms, instructions for procedures in the field, and regulations issued pursuant to laws enforced by the Bureau.

1 GS–12 organization and methods examiner
1 GS–4 clerk

REAL ESTATE AND PROPERTY MANAGEMENT SECTION

Manages real and personal property; acquires or leases Bureau space; acquires surplus equipment; maintains records on all Bureau property; provides technical engineering consultation and advice; maintains documentary control of permits, agreements, and memoranda of understanding with Federal, State, and local governments, institutions, public-utility companies, etc.

Real-Property Management Unit:
- 1 GS–7 realty assistant
- 1 GS–3 clerk-typist

Engineering Services Unit:
- 1 GS–11 architectural engineer

Permits and agreements unit:
- 1 GS–9 realty assistant
- 1 GS–7 realty assistant
- 1 GS–4 clerk-stenographer
- 1 GS–4 clerk

Property and equipment program management unit:
- 1 GS–9 property officer
- 1 GS–7 property officer
- 1 GS–4 clerk-stenographer
- 1 GS–4 property clerk
- 1 GS–4 clerk
- 1 GS–3 clerk-typist
- 2 CPC–3 laborers

RECORDS MANAGEMENT SECTION

Carries out records management program, including development, installation, and supervision of a uniform records system throughout the Bureau; supervises and controls the retirement and disposal of records; receives, controls, and dispatches communications; maintains Bureau's central files; provides messenger service.

1 GS–11 administrative officer, in charge

Communications unit:
- 1 GS–7 administrative assistant
- 1 GS–5 clerk
- 1 GS–3 mail clerk
- 1 GS–2 mail clerk
- 2 CPC–3 messengers
- 2 CPC–2 messengers

Current records unit:
- 1 GS–9 records analyst
- 1 GS–5 file superviser

Current records unit—Continued
- 1 GS–4 mail and file clerk
- 1 GS–4 file clerk
- 1 GS–3 mail and file clerk
- 5 GS–3 file clerks
- 2 GS–2 file clerks
- 1 GS–2 clerk-typist

Records retirement unit:
- 1 GS–7 records analyst
- 1 GS–5 records analyst
- 1 GS–3 clerk-typist

TRAFFIC MANAGEMENT, LAREDO, TEX.

Assists in transshipment of employees' household goods, Government equipment, etc., from Mexico to points in the United States (part year only).

1 GS–9 quarantine enforcement supervisor

BUDGET AND FISCAL DIVISION

(Employment February 28, 1953)

1 GS–13 administrative officer, in charge
1 GS–5 secretary

AUDIT AND FISCAL CONTROL SECTION

Formulates and installs auditing, fiscal-control and examination systems and procedures for the Bureau; examines and certifies for payment documents chargeable to appropriated, trust, allotment, and working funds; maintains records of employees' earnings; audits all fiscal activities and related records for compliance or noncompliance with prescribed procedures, rules, and regulations; codes expenditures for accounting and budgetary purposes.

1 GS–12 fiscal accountant, in charge
1 GS–11 fiscal accountant
1 GS–4 clerk-stenographer

Examination and Certification Unit:
- 1 GS–9 voucher-examining supervisor
- 2 GS–7 voucher-examining supervisors
- 5 GS–5 voucher-examiners
- 18 GS–4 voucher examiners
- 2 GS–3 clerk-typists
- 1 GS–2 clerk-typist

Employees' Accounts and Services Unit:
- 1 GS–9 fiscal accountant
- 1 GS–7 fiscal accountant
- 3 GS–5 payroll supervisors
- 15 GS–4 time, leave, and payroll clerks
- 1 GS–3 clerk-stenographer
- 1 GS–3 clerk-typist
- 1 GS–2 clerk-typist

Authorizations Unit:
- 1 GS–6 clerk
- 1 GS–5 clerk
- 1 GS–3 clerk-typist

FUND ACCOUNTING SECTION

Maintains accounting systems for control of all appropriated, trust, allotment, and working funds; prepares billings to collect or effect reimbursement of funds due for inspection and other services rendered firms and other Government agencies; examines for accuracy and legality all collections, refunds, and reimbursements, estimated at $3,298,205 for fiscal year 1953; analyzes and reconciles periodic statements of accounts rendered by 22 regional disbursing offices of the Department of the Treasury; records receipt and payment of vouchers; schedules audited vouchers for payment; makes accounting reviews of fiscal documents and maintains general and allotment ledgers and subsidiary records to control financial activities; compiles regular and special accounting reports and financial statements.

1 GS–12 fiscal accountant, in charge
1 GS–11 fiscal accountant
1 GS–4 secretarial clerk
2 GS–3 clerk-typists
1 GS–2 clerk-typist
Financial control unit:
1 GS–9 fiscal accountant, in charge
Billings and collections subunit:
1 GS–7 fiscal accountant, in charge
Billings group:
1 GS–5 fiscal accounting clerk
3 GS–4 fiscal accounting clerks
1 GS–3 clerk-typist
Accounts receivable group:
1 GS–5 fiscal accounting clerk
1 GS–3 bookkeeping-machine operator
1 GS–3 clerk-typist
Collections group:
1 GS–5 cash accounting clerk
3 GS–4 cash accounting clerks
Reconciliation and adjustments subunit:
1 GS–5 accounting clerk
2 GS–5 fiscal accounting clerks
1 GS–3 clerk-typist
Miscellaneous fiscal services subunit:
1 GS–5 fiscal accounting clerk
2 GS–4 fiscal accounting clerks
5 GS–3 fiscal accounting clerks
Methods and reports unit:
1 GS–11 fiscal accountant, in charge
1 GS–9 fiscal accountant
Methods and reports unit—Continued
1 GS–7 fiscal accountant
1 GS–5 fiscal accountant
1 GS–3 clerk-typist
Machine tabulating subunit:
1 GS–1 tabulating-equipment-operator supervisor
3 GS–4 tabulating-equipment operators
1 GS–3 card-punch operator
8 GS–3 tabulating-equipment operators
1 GS–2 card-punch operator
1 GS–2 tabulating-equipment operator
1 CPC–3 messenger
1 CPC–2 messenger
Financial control unit:
1 GS–9 fiscal accountant, in charge.
1 GS–3 clerk-typist
Ledgers subunit:
1 GS–7 fiscal accountant
2 GS–5 fiscal accounting clerks
1 GS–4 fiscal accounting clerk
1 GS–3 bookkeeping-machine operator
Obligation analysis and control subunit:
1 GS–7 fiscal accountant
1 GS–5 fiscal accounting clerk
4 GS–4 fiscal accounting clerks
1 GS–3 clerk-typist

ESTIMATES AND ALLOTMENTS SECTION

Prepares budget estimates and justifications and related materials; exercises appropriation and special limitation control though apportionment and allotment of funds and limitations; reviews and analyzes financial reports in relation to budgetary plans; maintain liaison with operating personnel on budget problems; maintains central files of financial and work projects under uniform project system including review of projects and annual reports; prepares monthly obligation and miscellaneous financial reports; maintains statistical records of employment relating to kinds, grades, types, locations, etc.; assists in drafting proposed legislation, legislative reports, and proposals for State legislation to implement Federal laws.

1 GS–12 budget analyst, in charge
4 GS–9 budget analysts
1 GS–7 budget analyst
2 GS–5 budget analysts
2 GS–4 fiscal accounting clerks (budget)
1 GS–4 secretary
2 GS–3 clerk-typists

SCRAPIE DISEASE OF SHEEP

Mr. ANDERSEN. What has been your emergency program relative to scrapie, the disease of sheep?

Dr. SIMMS. Scrapie was diagnosed last fall, in October, in California. It is a disease of sheep that has been known for many years. It has been present in the British Isles for well over 100 years and in parts of the continent of Europe. It is a chronic, slow-spreading disease, with a very long incubation period. It has appeared on the North American Continent prior to this time in Canada. It has been diagnosed in Australia. Both the Canadians and Australians have handled the disease by destroying all diseased and exposed animals and in that way attempting to stamp it out. Apparently they have been successful.

When the disease was diagnosed in California, it seemed to trace back to Canada. Sheep that had been imported from Canada were in the flocks where the disease was found.

Although the disease was present in only one county so far as we knew, it did seem to pose a rather serious problem. We were faced with the possibility of its gradually spreading to other areas just as it has done in England and Scotland. There was a very active and insistent request from the California Wool Growers and the National Wool Growers Associations that drastic steps be taken to stamp out the disease while, insofar as we knew, it was still restricted to a very small area and a small number of animals.

The United States Livestock Sanitary Association had its annual meeting in Louisville about that time and members were also of the opinion that drastic measures should be taken.

The Secretary, after giving it consideration and talking the matter over with a good many people, declared that an emergency existed which gave authority for payment of half of the indemnities on animals which were slaughtered under a cooperative program.

After that declaration we quarantined Butte County, Calif., in which the disease had been found, and we slaughtered the diseased animals and the exposed animals. The Bureau paid half the difference between the net salvage and appraisal value and the State of California paid the other half.

Insofar as we know, the disease has not occurred in any other flocks in California. We had fine cooperation from the California livestock sanitary authorities. They were very active in running down the flocks to which animals had moved from these purebred flocks. These animals which were sold for breeding purposes were brought back to the original flocks.

Since that time the disease has been found in both Ohio and Illinois. We know of 1 infected flock in Illinois, and 3 infected flocks in Ohio. The Illinois people had a meeting yesterday and one of our men was there. They have already killed all the animals that had the disease, but they have not killed the exposed animals.

Mr. HORAN. How do you treat them?

Dr. SIMMS. There is no treatment. After the animals begin to show symptoms they may live from 6 or 8 weeks up to that many months or even a year. It is a disease primarily of the nervous system. The animals without any apparent reason begin to itch and scratch. There is no redness or inflammation of the skin. In addition to the

itchy skin with a lot of scratching, there is trouble in walking. The animals walk with an uneven gait and finally go down and cannot stand in the later stages of the disease.

Mr. HORAN. Is it a virus?

Dr. SIMMS. It is a virus disease, yes. The research work that has been done with it was conducted mainly in Scotland. Some of the Scottish people have been working on it for many years. It is transmitted in some instances through breeding.

Mr. HORAN. It is more a matter of heredity than environment?

Dr. SIMMS. It can be spread through contact. It is transmitted by breeding and also by contact.

Mr. HORAN. As far as hereditary conditions are concerned, there is a tendency on the part of the animal to be infected by this virus, is that true?

Dr. SIMMS. That is right. Apparently from the records in Scotland and England, some breeds of sheep are more susceptible than others. In this country we have found it in only one breed.

Mr. HORAN. The best ones, I suppose.

Dr. SIMMS. Well, it is one of the popular ones, right now.

STATE COOPERATION IN CONTROLLING THE SPREAD OF COMMUNICABLE DISEASES

Mr. WHITTEN. Doctor, I have been concerned, along with Mr. Andersen and others, with this problem that you have had with this hog disease.

I come from a section where we like, politically and otherwise, to talk about States rights. Sometimes we do not talk quite as much about State responsiblitites. I wonder if you have any recommendations in the way of Federal legislation that would help with the type of problem that you have, these diseases which spread so rapidly, such as your hog disease.

Now I mention that because I am thoroughly aware of the problem through approving the transfer of funds within the Department.

All States have not cooperated as fully as they might, or as quickly as they might.

FEDERAL AUTHORITY TO ENFORCE DISEASE CONTROL

With the possibility of diseases being spread during wartime, I wonder if you have any recommendations as to the strengthening of the Federal law in proper cases to require cooperation on the part of the States in handling these diseases.

Certainly, if it were in a period when such disease was being spread by the enemy or some other situation like that, one State should not be able to injure the whole country.

Dr. SIMMS. We have not come forward with any proposed or recommended legislation.

Mr. WHITTEN. I hope you will give thought to it and let this committee and others know when you have come up with any recommendations.

I would like now for you to describe the weaknesses in the present setup, however.

Dr. SIMMS. That is something we have given a lot of thought to. The setup in our cooperative programs with the States is quite satis-

factory for some of the diseases. For instance, tuberculosis, brucellosis, and sheep scab. For diseases like foot-and-mouth disease and rinderpest, which do not occur in this country, States have regulations under their existing laws which will enable them to work in cooperation with the Bureau in an emergency program of eradication if they occur. Unfortunately, though, they have spelled the thing out in many States, with regard to certain specific diseases and have left a lot of other diseases unmentioned. Then in the case of a disease like vesicular exanthema the States have difficulty because they have no authority to act on a particular disease.

We have talked with the States and for the last 2 or 3 years have had a good many conferences as you might suspect with regard to biological warfare. We have recommended to them, usually informally, that they broaden the scope of their laws and place more authority in their livestock authorities to cope with these emergencies which might arise.

We just recently sent out letters to all of the Governors and the State livestock sanitary authorities asking that they move as vigorously as possible in regard to requiring cooking of garbage in their States. This is just one protective measure.

Mr. WHITTEN. One of the drawbacks is that the States feel that, if they do not move, the Federal Government will come in and pay all the costs. And if the emergency is sufficiently great they have learned that frequently the Federal Government will do it.

At the same time, I wonder whether we should let that condition continue?

Dr. SIMMS. We have taken the attitude that these programs should be cooperative and that the States should carry their part of the cost. I might say in connection with vesicular exanthema, we are being urged at the present time, or the Secretary is being urged, to declare an extraordinary emergency. This would allow the Federal Government to pay all the indemnities in connection with the animals that are slaughtered. The Secretary has not seen fit to do that, I might say. That was recommended as far back as last September.

Mr. WHITTEN. You have the authority to quarantine any State that fails to cooperate?

Dr. SIMMS. We have the authority to quarantine a State or a county in a State. Our quarantines, of course, are applicable only to interstate movement.

Mr. WHITTEN. You can bottle it up within the State?

Dr. SIMMS. That is right, we can close the State lines but we do not have authority to go into a State or county and quarantine an individual farm and say, "You cannot move cows or hogs." We can throw the quarantine around the State itself.

Mr. WHITTEN. I heard you say yesterday that the argument by some of these States was that, since hogs or cattle are sent in here from somewhere else and show up with the disease after reaching their borders, why should they pay half the cost, and so forth.

It strikes me this is a very thin argument. If it is a trading area, certainly it is part and parcel of the operations. On the other hand, if those hogs are in interstate commerce you do have the authority to clamp down and stop the interstate trade?

Dr. SIMMS. That is right. If we know those hogs are diseased we have authority to stop them immediately and not let them cross

State lines. As a matter of fact, they move on health certificates and they are not visibly diseased when they are shipped.

Mr. WHITTEN. I would like for you to give some thought to where the law needs to be strengthened, because the interest of every State is involved in this. It goes far beyond the question of who is going to foot the bill and far beyond States rights. The rights of the Nation as a whole are involved when you get into this type of disease, particularly a disease such as foot-and-mouth disease.

Dr. SIMMS. We are very pleased, indeed, to get your thinking and your reaction on this. It is something that we have discussed back and forth among ourselves and within the Department of Agriculture for the last several years.

Mr. WHITTEN. There would be reaction to any move of the Federal Government in this direction but the situation is such that we need to give thought to it.

Dr. SIMMS. We have been warned that there would be an unfavorable reaction if we sought for more authority.

I might say though that some of the livestock people themselves are interested in it.

Mr. WHITTEN. I think a little education along those lines would point out the need.

Mr. ANDERSEN. I have never known a time, Doctor, when you have presumed upon an authority simply because the authority had been granted to you.

Dr. SIMMS. We try not to. We try to work with the States concerned. That has always been our program.

Mr. ANDERSEN. I certainly agree with Mr. Whitten that it is absolutely necessary that the Federal Government have the power to step in, if necessary.

Dr. CLARKSON. Mr. Chairman, certainly in this program we have encountered all of the obstacles that can be encountered when the 48 States and the Federal Government have to cooperate on an eradication program.

As Dr. Simms says, there is lack of authority in various places. We have had instances where failure to act promptly was occasioned by lack of funds on the part of the State, and as a result the hogs were left there as a continuing source of the infection to be spread to other herds. We have had cases where the States either have not had the authority or have not wished to exercise the authority to quarantine premises, to order the slaughter of infected and exposed animals, and to order the cleanup of premises and all that sort of thing.

Each time an instance of that kind occurs the infection is there, remaining day in and day out to serve as further threat to the hog industry.

The Federal Government has the authority to apply interstate quarantines. We have under consideration now plans which would tend, as far as we have authority, to apply quarantine restrictions to a State that does not take adequate action.

However, we must realize that even such quarantine cannot in itself stop the spread of this disease. This is a virus disease that spreads extremely rapidly, and quarantine in itself is not going to be the answer. They have to devise means to get in on the premises to stop the spread of the disease at its source. One of those things, as Dr. Simms has mentioned, is the control over the cooking and feeding

of garbage, and of hogs which are fed on garbage is of prime importance in spreading the disease. That is within the prerogatives of the States, although various segments of the industry have been urging that we try to devise some means whereby we can take stronger Federal action.

Mr. HORAN. Are you not on dangerous ground when the Federal Government moves into a local area and throws its weight around?

Dr. CLARKSON. As the chairman mentioned a moment ago, that has to be considered seriously. We are examining our authority to see what we can do. We have always followed the plan of cooperating with the States, and we would prefer to follow that plan.

Here we find that with many of the States the program is going along very well, but with others, for one reason or another, either they are unwilling or unable to go along. Each center of infection that is allowed to remain is a danger to all of the other States. Therefore, everyone is looking for some uniform way in which the source of this infection can be got at rapidly and effectively.

Mr. HORAN. In the depression years we had the same difficulty with regard to codling moth in our apple orchards. We have no fences out there in many cases. Often a man might be doing a good job in controlling the spread of codling moth, and 50 feet away someone might not be carrying it out at all.

In the late thirties we did enact State laws, and there you get into a lot of difficulty, too, because we had one or two operators who would go out and swing a spray hose around for 15 or 20 minutes and according to the statute and the regulations he was taking care of his orchard. He was doing nothing of the kind. He was just hanging on to his equity, if he had any.

You run into the same thing in any control on a Federal-State basis. It is difficult to determine how far the Federal Government should go in the exercise of prerogatives over private property. It is the question at hand.

Mr. ANDERSEN. Dr. Clarkson, we have been living with this vesicular exanthema in California for a good many years, have we not?

Dr. CLARKSON. That is right.

Mr. ANDERSEN. If you folks had had the authority to go in there and clean it up, this outbreak would never have spread throughout the Nation, would it?

Dr. CLARKSON. If it had been cleaned up there, certainly we would not have had this difficulty upon our hands.

Mr. ANDERSEN. You never did have the authority to go in there and force them to clean it up, did you?

Dr. CLARKSON. No.

Mr. HORAN. Not directly.

Mr. ANDERSEN. Now, this leads to what Mr. Whitten has brought out. As a consequence, we now have it in 31 States, and it is a threat to the hog industry.

Dr. CLARKSON. We can with slower-moving diseases, such as tuberculosis, apply quarantines and educational methods and wait until the local situation can be cleared up. With a fast-moving disease such as this one, those measures do not work out so well.

Mr. ANDERSEN. I agree with Mr. Whitten. Sometimes we come to the point where the good of the many is above that of the few. This has reference to the general public in the United States, versus the people in a certain county or State.

Of course, I also agree very much with Mr. Horan that this is a dangerous field. That is why I put the question as I did to Dr. Simms.

Dr. CLARKSON. We are trying to find some proper way of handling it. The animal industry subcommittee of the House Committee on Agriculture is working with us to devise some program that will work. There is no easy answer.

Mr. HORAN. No. You see your individual hog owner says, "I did not bring on this disease and it is the Federal Government's fault if it came to us from another State and infected my swine."

Put yourself in his boots and you probably feel pretty sympathetic.

Mr. WHITTEN. That is the reason for bringing up the subject here. You do have that conflict of interest and difference of feeling. But if you blow that up a little more, we have the situation which came up in Mexico which we condemned so strongly. It just about wiped out an industry down there to the extent of about $100 million. I come from an area where feelings are stronger than in some areas. However, we need to provide some means where, in proper cases you can move.

EFFECT OF VIRUS DISEASES IN DOMESTIC ANIMALS ON HUMANS

Mr. HORAN. Is there any evidence to indicate that humans may be affected by this virus which apparently attacks the bones of the body of the animals?

Dr. SIMMS. Do you mean vesicular exanthema?

Mr. HORAN. Or any of these other viruses.

Dr. SIMMS. No, there are no indications that people are affected by this virus. There are, of course, a good many virus diseases in domestic animals that are transmissible to the human.

For instance, there is fairly good evidence to indicate that the disease called swine influenza, or hog flu, was originally human influenza that got into the hog and has been more or less adapted now to the hog. People can actually contract this disease from the hogs as apparently hogs got it from people back in 1918 during World War I.

Mr. HORAN. You may have noticed what I thought was a very pertinent observation by one of the heads of one of our medical associations day before yesterday in which he pointed up that we had become so supersanitary in our lives that, whereas polio is rampant among us, you do not find it in Africa where part of the water supply is probably little more than diluted sewage. The human body has the ability, of course, through the corpuscle system to build up its own antibiotics and its own immunizations. It is entirely possible that we are just ripe for the harvest if some of this did get loose among us. If it could be carried by animals or something which we might eat in certain circumstances, or if it was injected into the body, we might disappear in a hurry.

Dr. SIMMS. There are a number of diseases that are transmitted to the human. There is bovine tuberculosis, and the so-called deerfly fever described in the West many years ago, now called tularemia. It has occurred in your State. It is a disease primarily of wild animals. Sometimes domestic animals and people get it from them. Rocky Mountain spotted fever is a disease carried by lower animals and transmitted to the human.

Animal Research

utilization of forage

Mr. Andersen. Dr. Simms, you have asked for an increase of $293,348 in this budget for the purpose of a further study in the utilization of forage.

On page 131 of the notes you indicate this is part of a program carried out cooperatively with the Bureau of Plant Industry, the Bureau of Dairy Industry, and the Bureau of Human Nutrition and Home Economics.

Now how is that coordination accomplished?

Dr. Simms. Dr. Byerly will discuss that.

Dr. Byerly. Under the supervision of the Bureau of Plant Industry, Soils, and Agricultural Engineering, there is a laboratory located at Ithaca, N. Y. This laboratory was set up to study the basic problems with respect to the relationships between soils, plants, animals, and human nutrition.

The Administrator has set up an advisory committee to recommend supporting projects to be associated with the program of that laboratory, a technical advisory committee with representatives from each of the bureaus which you have named. It happens that this year I served as chairman of that technical advisory committee. The chairmanship is a rotating one. We meet twice each year, once at the laboratory and usually once at Beltsville or in Washington to review the program and to make recommendations.

The program of the laboratory itself, as I have stated, is directly addressed to problems covering the whole vertical area; the problems within the scope of each Bureau are supported as in this case, by a particular budget.

Now the problems we have in the production of livestock have been reviewed by the committee and have been reviewed by the bureau and by the Agricultural Research Administration so that there will be no duplication or overlap between the segments of this broad problem undertaken by each of the bureaus.

Dr. Clarkson may have some additional comment to make from the standpoint of administration.

Dr. Clarkson. I think that covers it. There is a continuing liaison between the bureaus in working out a common problem. That is coordinated at the administrator's level, and we think it is very effective.

Mr. Andersen. Now, Dr. Byerly, as part of the justification for an increase of $1 million, the Office of Experiment Stations states that it wants to study the utilization of forage crops—the exact same language that you have here.

Now is that not exactly the same work that you are proposing?

Mr. Byerly. Again, Mr. Chairman, one of the functions of this advisory committee is to review as far as we are able, the work that is going on in the States.

Mr. Andersen. Answer my question specifically. Is that the same work you are proposing?

Dr. Byerly. It is in the same general area. The specific problems will supplement and not duplicate each other. This will be carefully guarded.

Mr. Andersen. I might further state that the Forest Service at such places as the Inter-Mountain Forest and Range Experiment Station in Utah, is doing like work.

Dr. BYERLY. That is correct, and we do cooperate with the Forest Service.

Mr. ANDERSEN. You can assure the subcommittee, then, that there is very little likelihood of any duplication here?

Dr. BYERLY. Within the possibility of human review, I should say that the probability of duplication has been reduced to and will be kept at a minimum.

INCREASED PERSONNEL FOR FORAGE-UTILIZATION STUDIES

Mr. ANDERSON. How many additional employees do you propose for this particular increase?

Dr. BYERLY. I think the total is 37. I have a review of those and their location and duties. Would you like me to go over them or submit them for the record?

Mr. ANDERSEN. Describe them generally and extend your remarks in the record outlining the personnel increases by grade and where the people are to be assigned.

Dr. BYERLY. I beg your pardon. The statement I made refers only to the $178,348 which is a part of the animal-husbandry project. Mr. Butler has corrected me. The increase covers forage-utilization studies, research on bloat, and studies of increased parasitism and practices and measures to combat or prevent it.

PERSONNEL NEEDED FOR INCREASE ON DEVELOPMENT OF BETTER METHODS OF UTILIZATION OF FORAGE BY LIVESTOCK

Forage utilization studies, $160,000

Beltsville, Md.—Study of rumen microflora as an aid in increased utilization of forages by animals, techniques for evaluating forages, effectiveness of different forages, and fertilization, cropping, and harvesting practices in meeting needs for trace minerals, protein, energy, and other nutritional factors.

1 GS–12 nutritionist
1 GS–11 microbiologist
1 GS–9 physiologist
1 GS–9 statistician to compile, analyze and interpret experimental data
1 GS–7 biochemist
1 GS–6 administrative clerk
1 GS–5 statistical clerk
2 GS–4 clerk-typists
1 GS–3 agricultural aide
1 GS–3 scientific aide
2 GS–3 clerks
3 GS–2 agricultural aides
2 GS–2 scientific aides

Woodward, Okla.—Cattle-grazing studies to measure effectiveness of various pasture mixtures, supplemental feeds, and studies of management practices in meeting nutritional needs of cattle for more economical use of range and production of beef.

1 GS–9 nutritionist
1 GS–5 statistical clerk
1 GS–3 agricultural aide

Brooksville, Fla.—Development of cattle grazing and feeding practices which utilize year long pasturage grazing as far as possible and emphasize the best choice of forage species for different reasons for maximum efficiency of utilization.

1 GS–9 nutritionist.

Miles City, Mont.—Grazing and feeding studies with cattle directed at obtaining maximum returns, including freedom from nutritional disorders in livestock, from both grazed and harvested forage.

1 GS–7 nutritionist.

Dubois, Idaho.—Sheep-grazing studies to develop improved utilization of range forage and supplemental feeding practices for meeting nutritional needs and for insuring maximum genetic differentiation in sheep-breeding projects.

1 GS–9 nutritionist
1 GS–2 agricultural aide

Fort Wingate, N. Mex.—Evaluating sheep of different nutritional background to range feeding conditions.

1 GS–2 agricultural aide

Amarillo, Tex.—Biochemical laboratory studies on deficiencies of range forage.

1 GS–2 scientific aide

Tifton, Ga.; Raleigh, N. C.; Knoxville, Tenn.—Cooperative studies on forage utilization under different environmental conditions.

3 GS–3 agricultural aides (1 at each station)

Fontana, Calif.—Evaluating nutritive qualities of forages under different environmental conditions, using rabbits as experimental animal.

1 GS–2 agricultural aide

Glendale, Ariz.—Testing variety and location differences of alfalfa.

1 GS–3 poultry aide

Bloat, $58,348

Study of basic mechanism causing bloat, including research on physiological and biochemical reactions in rumen of cattle and sheep; testing chemical constituents of plants causing bloat when fed to animals; study of rumen flora, etc. Research will include fields of microbiology, physiology, pathology, etc.

Beltsville, Md.:
- 1 GS–13 veterinary coordinator
- 1 GS–11 veterinary bacteriologist and pathologist
- 1 GS–9 physiologist

Beltsville, Md.—Continued
- 1 GS–7 biochemist
- 1 GS–3 agricultural aide
- 5 GS–2 agricultural aides

Parasitism related to grassland agriculture, $75,000

Study of outbreaks of parasites on pastures to trace causes to source and to ascertain factors or practices responsible for the increased danger of parasites on pasture. Studies would include prevention, control, and eradication measures including treatments.

Beltsville, Md.
- 1 GS–12 parasitologist
- 1 GS–7 parasitologist
- 1 GS–4 secretary

Studies of lungworms, and liver flukes acquired on pastures, and treatment and control measures.

Davis, Calif.:
- 1 GS–12 parasitologist
- 1 GS–4 secretary

Davis, Calif.—Continued
- 1 GS–2 agricultural aide
- 3 cooperative agents

Study of parasites acquired in year-round grazing, particularly gastrointestinal parasites, effects of parasites on feeder cattle under different systems of management, and prevention and control measures.

Experiment, Ga.:
- 1 GS–12 parasitologist
- 1 GS–4 secretary

Experiment, Ga.—Continued
- 1 GS–2 agricultural aide
- 3 cooperative agents

RESULTS OBTAINED FROM FORAGE RESEARCH

Mr. ANDERSEN. What have been the results to date of this particular type of research?

Dr. BYERLY. We have found considerable areas naturally low in phosphorus. This is one of our broadest problems on which we have worked in the southwestern United States. It is complicated by the fact that forage has a seasonal variation in phosphorus content as well, so that during periods of drought and during the wintertime the phosphorus content of forage falls below the maintenance requirements of livestock depending upon it. In much of the range country, as you well know, cottonseed meal and other proteins are used, and one of the principal functions is to supply additional phosphorus for the range animals.

There are other complications in this phosphorus deficiency. For example, we know that adequate phosphorus will tend to keep down the incidence of development of calculi or kidney stones and bladder stones in cattle.

We know that cattle on deficient areas will show a low calf crop and cows themselves will be so affected as to eat bones and develop a creepy condition in which they go about on their knees.

In much of this area we have found it is cheaper to supply bonemeal or some supplementary feed or even phosphorous in the drinking water than it is to spread it over the large areas that are themselves deficient in phosphorous. This is one accomplishment.

The second accomplishment has to do with vitamin A. This is a "creeping paralysis" sort of deficiency. It takes months for the vitamin deficiency to show up.

In southern Oklahoma, for example, which is one of our least deficient areas in general, with normal rainfall, it did not rain much after the 1st of May last year until they had a 3-inch snowfall the other day. We have cattle there in cooperation with the Oklahoma station that are subsisting largely on dry forage. We had at least one calf born blind just a week or so ago from vitamin A deficiency. We know that about a pound of good green leafy alfalfa hay per day will prevent development of that type of deficiency.

We have found, too—and this is an accomplishment of the Soils, Plants, and Nutrition Laboratory—that many areas are deficient in cobalt. Now, cobalt is the essential element in vitamin B–12. It has applications for all animals and men. Without cobalt there is no vitamin B–12. They have mapped some of the areas deficient in cobalt. The difficulty in the deficiency is that the deficiency has no specific symptoms. The animals are emaciated and run down in condition. If we go out and give them cobalt and they respond, well and good, you have a cobalt deficiency. From a standpoint of analysis of forage, it is a difficult laboratory procedure requiring highly technical physical and chemical methods.

There is another problem which still remains with respect to cobalt and that is cobalt availability. Availability of other trace minerals in the forage is not well known. While it may be present in chemical analysis, it may not be available to the animal. The animal may be up to its neck in forage and grass and still be in bad condition if it will not eat the forage and then digest it.

There are great differences with respect to the digestibility and the nutritive value of forages. Unknown differences that we have not got mapped.

We know that copper will counterbalance molybdenum to a certain extent. We do not know what the balance is.

We know in other areas of the West that there are selenium toxicities and we know that arsenic will counterbalance that. We do not have adequate information to say to a man, "In this particular area you must use a little arsenic in order to counterbalance the selenium."

Our knowledge is limited in all of these things. As a result we are only getting from the grass and other forage we produce about half its potential value. We feel that utilization of the forage we now have can be increased through basic research, and basic research is the only thing that will lead to an increase in the efficiency of production.

We know other problems will come when we apply fertilizer. We know problems will come from irrigation, and we know that problems will come from new plant species. Part of this has to do with the old bloat problem. We know that the more clover we have the more bloat we get. We do not always get bloat. Some animals do not bloat. Some you cannot make bloat. Some will bloat even on dry, good alfalfa hay with nothing else in it. This is a very important area, Mr. Chairman.

REVIEW OF RESEARCH PROJECTS

Mr. ANDERSEN. You have $3,750,000 in fiscal year 1953 for animal research.

Now, it would seem to me that somewhere in that huge sum of money there should be spots where old research could be discontinued so that you could go into this new work that you propose.

Is there not a chance to do that, instead of asking for an increase of $293,000?

Dr. BYERLY. Mr. Chairman, our research program contains no projects which we feel are unfruitful or unimportant or which should be eliminated.

Mr. ANDERSEN. I do not doubt the need for increased knowledge but I wonder whether in your enthusiasm for research you cannot see the forest for the trees in relation to some of these projects. $3.75 million is a lot of money.

Dr. BYERLY. It is a large sum of money. However, in proportion to the problems to be accomplished, it is a very, very minute sum of money. The problems are very large. This amount of money will enable us to make only very slow progress in proportion to progress we would like to make. Surely we are enthusiastic.

Mr. ANDERSEN. You would have to be enthusiastic to be worthwhile in your position.

Dr. BYERLY. We do review these projects and we do bring projects to an end and we do start new work without coming to the Congress for new money. We do the best we can and I believe our best in this case is pretty good.

RESEARCH ON DISEASES OF POULTRY AND SWINE

Mr. ANDERSEN. Under "Animal research," you are asking for an additional $235,000 for research on diseases of poultry and swine. In other words, a $530,000 increase above the $3,756,000 we gave you last year. That is the sole cause for my question as to whether or not somewhere along the line that ought to be closed out to make room for this new and perhaps far more justified research.

Dr. Simms, would you like to comment on that?

Dr. SIMMS. I would enlarge on what Dr. Byerly said. All our research work is under constant review. We are always receiving from the field requests for help in solving this, that, or the other animal problem, either disease or nutrition or breeding or whatnot, that we cannot take care of.

That being true, we are always under pressure. If we have a project that is not productive, if we have a project that for some reason or other we think has more or less outgrown its usefulness, the pressure is so great that we have to drop that project or cut it down to a minimum. For instance, we have stopped almost all of our work with horses. The horses became a relatively minor animal on the farm.

We could not justify in our own mind the spending of very much money on diseases of horses or on nutrition and breeding of horses.

Mr. ANDERSEN. Dr. Simms, do you not think the fact that we reduced your appropriations in former years helped you in reaching that conclusion?

Dr. SIMMS. Well, this thing was true. The demands for research work were so great that we did not have funds enough to cover the whole field; yes.

Mr. ANDERSEN. And you have pressure put on you just as we have pressure put on us.

Dr. SIMMS. We are constantly shifting our funds within the structure that we have.

As I said, the horses are an example of that.

Another example we could point out is hog-cholera. Hog-cholera is still a very important disease with us but we are not spending as much money on that now as we were back a good many years ago because we at least found a way to live with it when we worked out the antiserum. So we shifted some of that money to other fields. We have cut a little money off here or somewhere else in order to have some to enlarge our research with vesicular exanthema. If there is any dead timber we have covered it up very skillfully in so far as our own Bureau is concerned because our own people are coming in and saying, "Here is a problem that we need to work on; that we need to study. Can't we find some money somewhere?" Our own people are constantly reviewing expenditures.

I would say that in some instances we have dropped work a little too early rather than held on to it a little too long.

We may have made both errors but we have dropped it too early more frequently than we have held on too long.

Mr. ANDERSEN. Doctor, this subcommittee has always backed you up through the years. At the same time the members of this subcommittee have a responsibility to the people of the Nation. We cannot become too provincial and think merely of agriculture. At the same time we do have to protect agriculture. The big job for us is to determine the proper balance across the board. That is the only reason I am bringing up this subject today.

Dr. SIMMS. We have been going through the wringer for several years. While we have had some increases in total appropriations, increases in salaries, in the cost of animals that we buy for experiments, and in the cost of feeds for these animals have squeezed us to where we have fewer people on many of these projects now than we had 5 or 6 or 7 years ago.

Mr. ANDERSEN. We appreciate your problems and we would like to do what we can to help you.

Mr. HORAN. I come from an area where my father was in livestock production. We had hairless pigs. That was due to a deficiency. Of course, throughout the years we have recognized that is not a new idea at all. We know that to be peculiar in certain soil conditions.

When our bill was on the floor last year I pointed out the work of the insurance companies in the 90-mile desert in Australia where sheep were allowed to forage and their wool became stringy and lifeless.

In the 90-mile desert today, as I understand it, they are adding cobalt to the soil and I suppose balanced additions of zinc and copper

because they are adding all three elements and they are bringing in about a thousand acres every 2 weeks.

Now we recognize all of these things. We recognize that it is a field that does need research.

We feel a lot of research already exists, not only by ourselves but by other countries presumably with whom we have research exchanges.

COORDINATION OF SIMILAR RESEARCH PROGRAMS

In addition to the direct work that you have here with regard to the nature of soils and the resultant production from those soils, whether it be crops or livestock, it is relevant.

We have in the BAE, also, an item very closely associated with this item for $100,000 increase, which I did not feel they justified very well, even though I consider them qualified.

In that general field, how do you coordinate that, how do you work with other departments, and how do you attempt to profit and save money through coordinating your work with other countries?

In other words, how do you go about making the most of what you have?

Dr. BYERLY. It is the first responsibility of each project leader to be familiar with existing knowledge related to his research problem. When I speak of a project leader, that means a man of professional qualification, a GS–11 or GS–12 in most cases. He is responsible for intimate knowledge of all of the work within his field. Now this is not a perfect thing as you well know. Some are more diligent than others. Within the framework that I described and with respect to the additional framework resulting from other meetings in this field, it is possible, first of all, to bring the existing knowledge before the project leaders. It is the first function of the head of the soils, plants, and nutrition laboratory to be familiar with the basic research in this field and he has done a very good job of it. He has presented some excellent summaries, one before the Delaney committee, last year. I think you were present when he presented that. He made a presentation on the utilization of fertilizer. He is doing excellent work.

This is the first job, to find out what is known. Then to find out what is unknown and to find out whether the existing knowledge will give clues to the problem that exists, to the solution, so that time may be saved.

It is not always possible to say, "This man has done that and it did not work; therefore I must not do it." Oftentimes in reviewing a failure, you find a clue to doing something in a somewhat different way and coming up with a positive answer. The problem is very great and it is the responsibility of every project leader to be familiar with his own area.

Now part of this is library research. A great part of it comes in the attendance at scientific conferences and meetings. He must know and work with his fellows, regardless of where they are, whether they are in universities or in research institutions. This problem of being aware of the current status of the problem on which he is working is the first responsibility of a project leader.

The administrative problem of seeing to it that he is aware is a difficult one and this again will depend on the knowledge and skill of a supervisor. He may be fooled some times, but he cannot be fooled for very long.

In this particular area, however, I believe Beeson has done a masterful job.

I am not familiar with everything my colleagues are working on. I have to go to them and ask them.

Research is a personal thing. It is done by people and you have to have good people. Some times you get stuck with some who are not so good and then you have to do the best you can.

Does that answer your question, Mr. Horan?

DETERMINATION OF PROJECT EMPHASIS

Mr. HORAN. Yes. I assume through the years, through the use of scientific control items in any given project that you occasionally come up with a fact that you can nail down. Research can be reduced there to a minimum and then you move into the field where you are seeking answers that you do not have.

Dr. BYERLY. That is right. Vitamin A is an example. For 15 years we carried a herd of cattle at Beltsville devoted to basic research on vitamin A requirements. We carried them on a vitamin A study with respect to all responses. We did not exhaust the vitamin A problem by any means. I expect in the budget requests you will still find requests for studies of the utilization of vitamin A, but with respect to the basic requirements of cattle we felt that we had brought it to a place where there were other projects more urgent, and terminated that project and started one on protein requirements which we think will go on for 15 years.

We made a direct substitution. The same thing is true with regard to the phosphorous problem, with respect to the general area study 2 years ago. We deemed this less urgent at that time because we had more knowledge in that area and we eliminated certain work we were doing to carry on some we felt was more urgent. We do not always eliminate the right project, but we do the best we can.

Mr. HORAN. For a long, long while—I do not know how many decades—the studies and the learning about the facts of feeds and feeding has been regarded as one of the most difficult subjects in any school or university because it involves an intimate knowledge of the very things you are discussing here with this subcommittee.

My reason for asking this question is that I know of an enormous amount of work that has been done in this field.

Dr. BYERLY. May I make one point, there? For every answer you get, you raise at least two questions that are unanswered in this area. The amount we do not know is so much greater than the amount we do know. Whenever we get an answer, it immediately poses more questions than it answers in itself. It is an expanding thing. Research is not a limited thing.

Mr. WHITTEN. Listening to the question of my colleague, Mr. Horan with regard to the need for research, I have felt that the research activities of the Department should be reviewed. What percentage of your research projects are checked and reviewed by people in the industry and folks on committees who are interested in the livestock industry, Dr. Simms?

Dr. SIMMS. I would say most of them are gone over by more than one group of people.

Mr. WHITTEN. What percentage of the requests of those people in the industry are you able to meet; that is, the problems they want you to meet, where they say a real problem exists and the answers are

highly important and where Federal money could well be spent? What percentage of such requests are you able to meet under your present budget? I am just asking for your best judgment.

Dr. SIMMS. It is only a small percentage we are able to meet. We are requested by the different industry and commodity groups to initiate research and to expand the research that we have under way far beyond what we are able to do with the funds available.

Mr. WHITTEN. There were two reasons why this committee surrendered its authority to advisory committees to a large extent, instead of trying to pass on these projects, item by item. We turned it over to the present method of operation with the belief that folks in the business would have better judgment as to what they should urge you to do than we would on the committee.

Secondly, we felt that the pressures from folks in the business, where there was not enough money to meet the needs, would be the best means of getting each bureau to do only the work most needed.

Has it worked that way?

Dr. SIMMS. I think it has; yes. I think the very fact that our project leaders know that their coworkers and industry people are both reviewing what they have under way and are reviewing it in the needs for the projects——

Mr. WHITTEN. Many of these people can see lots of things you could eliminate in some phase of the work they are not connected with. Yet, the people in the other phase can well see that you ought to enlarge the items they are close to and eliminate something else.

Dr. SIMMS. Human nature being what it is, some people will probably always be somewhat unreasonable, but it has been a healthy situation. It makes it very difficult to cover up some unproductive project or some project that has already reached its ripe old age, as you say, and should be discontinued.

Dr. MCPHEE. Mr. Chairman, could I make a comment here on what Dr. Byerly has been discussing?

ADVISORY COMMITTEE RECOMMENDATIONS

The Livestock Advisory Committee, following its meeting December 15–17, made the following recommendation to us:

By cooperative efforts of all interested agencies of the Department, develop information to implement the program of grassland agriculture.

That was No. 1 of their recommendations under feeding and nutrition.

TOTAL SPENT FOR LIVESTOCK RESEARCH

Mr. LAIRD. I would like to know what the total estimate is on the amount of money spent in this country on livestock research per year?

Dr. SIMMS. I am sorry I cannot give you a figure on that, but I can put it in the record for you. The ARA Office has it.

Mr. ANDERSEN. You have reference to animal research in all phases.

Mr. LAIRD. Yes.

Dr. SIMMS. And in all parts of the country, including the State experiment stations?

Mr. LAIRD. States, universities, colleges, and various trade associations.

Mr. ANDERSEN. Will you try to get us an answer to that for the record, Dr. Simms?

Dr. SIMMS. We will be glad to put that into the record. It is available but I just do not know the figure.

(The information requested is as follows:)

Federal and State contributions to animal research

[In millions of dollars]

	Production	Utilization	Total
Bureau of Animal Industry	3.86	.32	4.18
Other U. S. Department of Agriculture funds, including Federal grant funds to State agricultural experiment stations	5.00	1.71	6.71
Non-Federal funds of State agricultural experiment stations	17.75	.88	18.63
Total, U. S. Department of Agriculture and State	26.61	2.91	29.52

NOTE.—Information on funds available for research at private institutions not available.

Dr. CLARKSON. In obtaining figures from the agricultural experiment stations throughout the country we find that their estimates of need for additional research are as high if not higher, in this field, than in other fields.

ACCRUED COST OF VESICULAR EXANTHEMA CONTROL

Mr. MARSHALL. I believe, Mr. Chairman, that we ought to have in the record a statement showing a cost-to-date of the vesicular exanthema.

Dr. SIMMS. We will put that in the record.

(The information requested follows:)

VESICULAR EXANTHEMA ERADICATION PROGRAM

Total obligations by appropriation items, July 1, 1952 through Feb. 28, 1953

Eradication of foot-and-mouth disease and other contagious diseases of animals and poultry:		
Indemnities		$1,374,743
Special disinfecting costs:		
Salaries	$5,592	
Other expenses	44,408	
		50,000
Total, Eradication of foot-and-mouth disease and other contagious diseases of animals and poultry		1,424,743
Salaries and expenses (animal disease control and eradication):		
General diagnosis, control and eradication activities performed by regular personnel detailed from other projects:		
Salaries (37.8 man years)		215,731
Travel		42,604
Other expenses		67,355
Total, salaries and expenses		[1] 325,690
Grand total		1,750,433

[1] Virtually all of funds were obtained by reallotment from the project "Eradicating tuberculosis and brucellosis" with minor amounts from several other projects.

STATE CONTRIBUTIONS

Cooperating State obligations for indemnities are likewise $1,374,743. No exact information is available on other expenses, but the Bureau estimates that contributions for such expenses were equal to or greater than those of the Federal Government.

Number of infected and exposed swine and estimate of indemnities, Feb. 28, 1953

State [1]	Number of infected or exposed swine	Obligations for indemnities						Potential obligations for indemnities [3]		No indemnities, number of swine
		State funds available		State funds not available [2]		Total				
		Number of swine	Amount	Number of swine	Amount	Number of swine	Amount	Number of swine	Amount	
Alabama	1,915									1,915
Arizona	2,026	1,584	$23,407.59			1,584	$23,407.59			442
Arkansas	86	86	717.92			86	717.92			
Connecticut	9,147	142	3,229.85			142	3,229.85	9,005	$117,910.00	
Florida	415	415	10,605.00			415	10,605.00			
Georgia	2,024	2,024	39,025.50			2,024	39,025.50			
Idaho	383									383
Illinois	14,538	14,538	185,949.12			14,538	185,949.12			
Indiana	1,695	1,695	15,290.60			1,695	15,290.60			
Iowa	4,426	4,426	57,869.05			4,426	57,869.05			
Kansas	8,160	7,937	140,821.84	216	$3,180.00	8,153	144,001.84			7
Maine	5,000							5,000	75,000.00	
Maryland	4,043	898	1,540.00			898	1,540.00			3,145
Massachusetts	27,949	7,955	100,000.00	2,165	9,709.82	10,120	109,709.82	17,829	267,435.00	
Michigan	5,621	5,621	74,515.54			5,621	74,515.54			
Mississippi	1,000	1,000	10,000.00			1,000	10,000.00			
Missouri	10,123			10,123	153,742.23	10,123	153,742.23			
Nebraska	10,733	10,733	139,095.33			10,733	139,095.33			
North Carolina	58	58	2,402.50			58	2,402.50			
Ohio	2,807	2,807	28,966.16			2,807	28,966.16			
Oklahoma	5,819			634	9,139.78	634	9,139.78	4,600	69,000.00	585
Oregon	3,176			3,176	50,104.73	3,176	50,104.73			
Rhode Island	5,369	5,369	76,184.18			5,369	76,184.18			
South Dakota	4,213			4,213	55,599.98	4,213	55,599.98			
Tennessee	1,705	1,705	10,363.72			1,705	10,363.72			
Texas	2,954	1,277	13,159.79			1,277	13,159.79			1,677
Utah	3,523									3,523
Virginia	7,330	1,644	31,145.71	2,109	11,685.95	3,753	42,831.66			3,577
Washington	6,397	5,127	76,677.42			5,127	76,677.42			1,270
Wisconsin	1,369			1,369	16,442.85	1,369	16,442.85			
Wyoming	2,238	2,238	24,171.14			2,238	24,171.14			
Total	156,242	79,279	1,065,137.96	24,005	309,605.34	103,284	1,374,743.30	36,434	529,345.00	16,524

[1] Current data not available on infected or exposed swine in California, New Jersey, New York, and Pennsylvania, which States are not presently cooperating in the vesicular exanthema eradication program.

[2] Pending legislative action providing funds.

[3] Animals not yet appraised for slaughter.

Mr. WHITTEN. I would like for the record to show with respect to the report Mr. Marshall has asked for, that you have met the need insofar as personnel is concerned, by having these people attend to this vesicular exanthema job as against other work. But even there you had to take them off the other job and to that extent as Mr. Marshall has said, it has been an expense. Though your same people did this job at the same rate of salary and at no more dollar cost, it was at some sacrifice of the work which they would otherwise have been doing.

Dr. SIMMS. Which we were not able to forget, because the State livestock santiary authorities who were working on brucellosis and tuberculosis eradication in the different States really asked us some pretty pointed questions—"Why are you pulling this man away from this program in North Dakota, or New York, and putting him on this hog disease?"

With regard to the cost of the vesicular exanthema control program, we can give the amount the States have spent on indemnities. It would be rather difficult to give the cost of personnel because we would have to more or less guess at how many men the different States have put on it.

Mr. HUNTER. Somebody mentioned that some of these State people were questioning your program, wondering why you were taking so many people off of other projects and putting them on this particular project.

What kind of cooperation generally have you received from agencies within the State of California?

Dr. SIMMS. We have not had an eradication program in the State of California, but I would say that in general we get very good cooperation from Dr. Boyd, the State veterinarian in California. He has been an excellent supporter of the program. We have not had an eradication program in California, thinking the disease would be attacked in California last. We would try to get rid of it in the other States first. But I would like to say for your information that we have gotten very fine cooperation from Dr. Boyd and his coworkers.

DISEASES OF POULTRY AND SWINE

Mr. ANDERSEN. The second item of increase has to do with diseases of poultry and swine, $235,000.

It appears that two diseases which require special attention are air-sac disease in poultry and atrophic rhinitis of swine.

What is the present situation with respect to both of those diseases?

AIR-SAC DISEASE

Dr. SIMMS. The disease which is spoken of as air-sac infection in poultry, as you will probably remember, became increasingly serious among the broiler producers during the year 1951. Starting in the spring of that year it built up until the winter of 1951–52 when it was causing loss of very large numbers of poultry in the broiler areas.

You will recall that last year we used available funds and started research work in cooperation with the experiment stations in areas where research work could be done. That work is being continued. We are making progress, but the losses from air-sac infection, so-called, are still heavy and we are hoping to continue this work.

You will recall that before we entered into contracts with the experiment stations, this was discussed with the committee. It was with your permission that that was done. These contracts will be running out. We think that this work should be continued and the only way we can continue it is to rewrite the contracts.

Mr. ANDERSEN. You would state that this air-sac condition is really quite a serious problem in poultry?

Dr. SIMMS. It is and has been a very serious problem.

The broiler industry has come to be a big industry. This disease has caused very heavy losses resulting in millions of dollars.

ATROPHIC RHINITIS

Mr. ANDERSEN. Now will you discuss the atrophic rhinitis situation?

Dr. SIMMS. This disease, insofar as we know, was recognized in the United States only about 10 or 12 years ago. Workers at Purdue University were the first to see and describe it as a specific and definite disease in this country.

It spread, not too rapidly, but we began to hear more about it. People began to ask us more about it. By 1945 or 1946 we began to realize that it was fanning out.

By 1947 or 1948 it became serious enough so that we began asking about the possibility of getting some research started, both by our own people and at the different State experimental stations.

It has become increasingly serious. It has spread until now we know it is present in all of the Corn Belt States where hog production is fairly or very large. The swine producers themselves have come to us with requests that we do something about it.

Mr. ANDERSEN. Are you spending any money today in research?

Dr. SIMMS. Yes, we are doing some research. Here again is one of those instances where we didn't come in and ask for a special appropriation, but we thought the pressure was great enough on atrophic rhinitis and we started some work on that, and just continued or held in abeyance some of the other projects.

AIR-SAC DISEASE OF POULTRY

Mr. ANDERSEN. Now reverting to this air-sac disease of poultry, I believe you received an additional $75,000 for research on this specific disease for 1953.

Dr. SIMMS. That's right. It was a $75,000 increase to the appropriation.

I might say this air-sac money is almost all being spent at the different experimental stations.

Mr. ANDERSEN. Doctor, since this same amount will be available next year, assuming that no reduction will be made in the appropriation below 1953, why are you asking for further additional funds?

Dr. SIMMS. Yes; the $75,000 would be available, but funds used in the original contracts in 1952 will be exhausted when the 2 years are up. The research work will then fall back to the level that can be supported by the $75,000, unless we have some other methods of support.

In other words, this is to continue work that is already under way.

RESEARCH ON SWINE DISEASES

Mr. ANDERSEN. Doctor, your Bureau has allocated $380,000, which we furnished you in 1953 for research on swine diseases. What major projects are covered by that $380,000 and what priority do you place on each?

Dr. SIMMS. We are doing some work with atrophic rhinitis at this time. We have increased the work on that as the disease has become more prevalent and a more serious disease.

We are doing some work with hog cholera. We have worked particularly with the new strains of the hog-cholera virus that we found 2 years ago, a type of virus that would produce hog cholera even though the hogs were vaccinated with the antiserum.

We're working with swine erysipelas, a troublesome disease that has been spreading somewhat in this country. We have developed a method of vaccination—I say "we" have, but it was developed in Europe and we worked on it here and improved it. We are still working on that and are studying the methods of spread and trying to get a better vaccine.

Mr. ANDERSEN. Some of these you have been working on for a good many years?

Dr. SIMMS. That's right.

Mr. ANDERSEN. I presume you have hopes of finding a satisfactory solution?

Dr. SIMMS. Yes, we're making progress—I say "we." I don't do the work so I am not complimenting myself. Our men did very good work with the outbreak of cholera that came from regular vaccination 2 years ago when we got the new strain of virus in. We are still doing some work with that because it is still a headache to us. You know it caused quite heavy losses the summer before last, in the Corn Belt.

COORDINATION OF RESEARCH PROGRAMS

Mr. ANDERSEN. Now, in the justification for the Office of Experiment Stations it indicates the need for an increase in research in animal diseases. Now isn't that about the same thing you are proposing here?

Dr. SIMMS. I think the amount of duplication between the experiment stations and the Bureau in animal disease work is surely held down to a minimum.

Mr. ANDERSEN. Then we get back to the same old thing that bothers us, coordination.

Dr. SIMMS. We do have excellent coordination.

Mr. ANDERSEN. I am glad to have your assurance on that.

Dr. SIMMS. We do have excellent coordination. I am personally acquainted with the veterinarian in charge of the research work in at least 45 of the 48 experiment stations in the United States.

Mr. ANDERSEN. They are not doing the work you are doing?

Dr. SIMMS. They work in cooperation with us. They know what we are doing and we know what they are doing. We sit around the table and plan the work before it starts. For instance, on the bloat program, we called a meeting in Chicago and everyone who was working on that was there.

INCREASED PERSONNEL FOR POULTRY AND SWINE RESEARCH

Mr. ANDERSEN. Now, Doctor, in relation to the $235,000 additional you requested for research in diseases of poultry and swine, how many new people do you contemplate and what will they do? Please supply that for the record.

(The information requested follows:)

PERSONNEL NEEDED FOR INCREASE ON DISEASES OF POULTRY AND SWINE

Air sac infection of poultry.—None.

Atrophic rhinitis of swine.—Determination of causative agent methods of diagnosis, mode of transmission, preventive measures and treatments. Includes studies of role of trichomonads, pathology, etiology, etc.

1 GS–12 parasitologist	1 GS– 7 parasitologist
1 GS–12 veterinarian	4 GS– 3 agricultural aids
1 GS–12 pathologist	2 GS– 2 agricultural aids
1 GS–11 veterinarian	

Mr. HORAN. I think in the case of air-sac you will be able to have contractual relations.

Mr. BUTLER. There would be no increase of personnel under air-sac.

Mr. HORAN. You are continuing to make this a department project, this rhinitis work?

Dr. SIMMS. Yes. There will be some increase in personnel there.

ANIMAL DISEASE CONTROL AND ERADICATION IN LOUISIANA AND MISSISSIPPI

ERADICATION OF SCABIES

Mr. ANDERSEN. Now, Doctor, the next item concerns $35,000 additional requested for scabies eradication in Louisiana and Mississippi.

In fiscal year 1953 you received $172,000 for eradication of scabies. How is that being used?

Dr. SIMMS. The money that is available is being used mainly in the States of Mississippi and Louisiana, with small amounts being used in other States.

Scabies in sheep was at one time a very serious disease in the range country. Mr. Horan mentioned the fact that as far back as 1905 we were spending money to eradicate that disease, and we did eradicate it. We went for many years with no scabies being reported at all in the big range States where sheep run in large numbers. However, we never did get the disease completely licked in some of the small-flock areas. It was smoldering along, for instance, in places like Arkansas and particularly in Mississippi and Louisiana. We had it almost licked in Louisiana one year and our money ran out. The war came on, our men went into the Army, and scab took hold again.

Now, when sheep got high priced, they moved some out of Louisiana. Those sheep moved in a direction in which sheep don't ordinarily move. In other words, Louisiana sheep went to Texas, Oklahoma, and New Mexico. That isn't normal. And when they did, they took sheep scab with them. Texas had sheep scab in 54 counties, and it was a tough picture. Sheep scab showed up in South Dakota, in California, and Kansas.

The sheepmen themselves came in and said, "We must get rid of sheep scab in Louisiana and in Mississippi, in order to protect our big sheep industry of the West." Louisiana and Mississippi, having relatively small sheep industries, had never been particularly active in trying to get funds from their State legislatures to eradicate the disease.

Mr. ANDERSEN. And now you're concentrating in those areas?

Dr. SIMMS. Yes, now we're concentrating in those areas. The sheepmen of the West said to us, "We'll take care of our sheep scab; don't spend any of this Federal money here. Spend it down there in that "hotbed."

I thought that was a very fine attitude on their part.

Mr. ANDERSEN. According to this, you don't think you have enough to take care of the situation?

Dr. SIMMS. We're winning. We're doing a good job down there and we need now to get this final push.

Mr. ANDERSEN. Now, if we give you this $35,000 additional, when can you assure us you will have this thing licked?

Dr. SIMMS. I think if we get this $35,000, we will have Louisiana and Mississippi both clear of sheep scab in a year and a half. I can't make that a promise, but I think we will have them clear in that time.

Mr. ANDERSEN. You will have then a program of about $210,000 a year to do it?

Dr. SIMMS. Now don't misunderstand me. We will still have scab left in States like West Virginia, Arkansas, and still some left in Ohio.

Mr. WHITTEN. I have had a good many people tell me they couldn't understand why my State of Mississippi didn't go into sheep raising to a large extent. I inquired into it and was told we could be a great sheep State but we had a very limited market for mutton.

We have no market down there, because people haven't been accustomed to eating mutton and lamb through the years, and the more you think of it, it's doubtful that the local market exists. It is not only in my State but in Memphis, Tenn., and other cities where sheep have not been used for food to any considerable extent.

I mention that because that's one of the factors that enters into what the various sections of the country produce.

Dr. SIMMS. There was a time, Mr. Whitten, when the South produced large numbers of sheep. For instance, the State of Alabama, with which I happen to be a little more familiar, had in 1860 something like 400,000 sheep.

Mr. ANDERSEN. Doctor, what kind of cooperation are you securing from the States of Louisiana and Mississippi in this work?

Dr. SIMMS. We get very good cooperation all the way through in Mississippi from the State livestock sanitary officials.

Mr. ANDERSEN. Now tell me just exactly why you can't meet the situation down there with the amount of money you now have.

Dr. SIMMS. I think we could, but I think it would be cheaper if we put on a faster campaign. It's the speed with which we work.

The sheep in Mississippi and Louisiana run in a wooded area, a cutover logging area, where there is a lot of brush. Control of the sheep scab down there is mainly finding the sheep. It is easy enough to dip them after we find them but it's a question of finding them and getting enough people in there so we can find all the sheep and get them out and dipped promptly.

Now I think you can see in a program of this sort, which is one of attrition, it will take a long time, but if we can increase the size of our staffs so we can get the dipping done promptly, I think it would be a more economical job.

STATE COOPERATION IN SCABIES CONTROL

Mr. LAIRD. I would like to ask what type of contributions those States are making?

Dr. SIMMS. I'm sorry, I can't tell you just how much they're putting in, but they are contributing men, and they are carrying their share of the load.

Mr. LAIRD. Are they stepping up their program?

Dr. SIMMS. Yes; they are.

Mr. LAIRD. Next year?

Dr. SIMMS. Now I don't know about stepping up for next year, but they have stepped up their load since we have stepped up ours. They have given us very satisfactory cooperation.

INCREASED PERSONNEL FOR SCABIES CONTROL

Mr. ANDERSEN. Doctor, will you also place in the record how many new employees will be required under the $35,000 increase, if it is allowed?

Dr. SIMMS. Yes, we will be glad to do that.

(The information requested follows:)

PERSONNEL NEEDED FOR INCREASE ON SCABIES ERADICATION

Eight GS–6 agents (3 in Mississippi and 5 in Louisiana)

Cooperative livestock inspectors, working under State laws, who will inspect sheep, supervise dipping, enforce quarantines, and certify to movement of sheep from quarantined area.

CONTRIBUTIONS TO COOPERATIVE PROGRAM IN MISSISSIPPI AND LOUISIANA FOR ERADICATION OF SCABIES

The Bureau does not have exact information on State cooperative funds used in scabies eradication program in Mississippi and Louisiana. Bureau estimates of the value to personal services, dipping vats, equipment, travel, and other expenses furnished is $25,000 for Mississippi and $50,000 for Louisiana.

CATTLE-TICK ERADICATION ALONG TEXAS BORDER

Mr. ANDERSEN. Item 4 involves a $94,190 increase for cattle-tick eradication along the Texas border.

How is the $289,250 in fiscal 1953 for that purpose being used?

Dr. SIMMS. The $289,250 that we had for 1953 was used as follows: $188,900 in Texas, $67,500 in Puerto Rico, $8,500 in Florida, and $24,250 in the District of Columbia, which includes some laboratory work in furnishing dip-testing outfits for field work, and $100 in California.

I might say that the Texas situation is not one that we can hold out very much encouragement on, in that we don't see any end point there. In many of our jobs we hope we are approaching a point where we can say we don't need so much money for this, like the sheep scab.

The reason that is true in Texas is because they have ticks across the line in Mexico, and as long as they have cattle with ticks on them immediately across the river in Mexico, and as long as the Rio Grande is as shallow as it is, some Mexican cattle will continue to cross into Texas.

Mr. ANDERSEN. Now Doctor, if you have to hold that more or less at a status quo, why do you ask for an increase?

Dr. SIMMS. We are asking for an increase because we are not doing as good a job down there as we need to. We should bear in mind in regard to ticks, that cattle ticks carry a disease that is called "tick fever."

Mr. ANDERSEN. You mean you are not doing as good a job as you could on our side of the river?

Dr. SIMMS. That's right.

Mr. ANDERSEN. You have no control on the other side.

Dr. SIMMS. That's right. We have no control on the other side. I am trying to make it clear that this is a job that goes on week after week, and month after month, and year after year, and it will continue for a long time.

Mr. ANDERSEN. Now will this money enable you to do a better job?

Dr. SIMMS. This will increase the number of people we have working there, so we can locate these animals when and if they come across, and we know they do come across, and we can locate them before they spread ticks, before the ticks get into the back country and begin to spread the disease that is called "tick fever."

Mr. Butler just pointed out to me here that with this $94,190 we would add 23 people to the staff.

Mr. ANDERSEN. Now what are you going to do about all these cattle coming in from Mexico for feeding purposes?

Dr. SIMMS. All those cattle that come in from Mexico are inspected and dipped. The arsenic dip that they go through before they come in will kill the ticks.

Mr. ANDERSEN. Are you positive that it is 100-percent effective?

Dr. SIMMS. Oh, yes. We have records going back almost 50 years on what arsenic will do to ticks.

Mr. HORAN. Is it a chewing insect?

Dr. SIMMS. It is a bloodsucking insect.

Mr. HORAN. How does the arsenic kill them?

Dr. SIMMS. It's a contact poison to them.

Mr. ANDERSEN. To my personal knowledge, a tick is a pretty solid substance in itself and is very difficult to kill.

Dr. SIMMS. Yes; they are tough.

Mr. ANDERSEN. I know; I have taken them off my boy.

Dr. SIMMS. The tick you have reference to is a different species than the one that carries tick fever in cattle. But they are all tough.

Mr. ANDERSEN. But just running cattle through a string of vats, are you positive it gets them all?

Dr. SIMMS. Yes; we had ticks in this country from Virginia to California back in 1905, and we eradicated them completely.

Mr. ANDERSEN. I remember, when I had cattle in 1923 in Beaumont, Tex., we had to keep them in a 400-foot square, and we couldn't so much as walk those cattle outside that square.

But you are positive, though, that they won't spread ticks all over the United States by letting these feeder cattle come in?

Dr. SIMMS. That's right. We have done that before; and, of course, they were dipped. If the animal gets across the river without being detected, it's on our side that it does the damage, as all our cattle in this country, 92 million of them, are susceptible to tick fever. So, if the ticks ever get across the Rio Grande and get scattered back into the cattle country, we would have very serious losses.

Mr. ANDERSEN. Doctor, is there any possibility of a reallocation of existing funds so you wouldn't have to ask for this increase of $94,000 for this work?

After all, you say it is a kind of thing we will have with us from now on.

Dr. SIMMS. I don't think there is any possibility. Our tick-eradication program in Puerto Rico is making very rapid progress, and we hope before too many years the disease will be wiped out down there. That's an expression of hope. And, when and if that time comes, that $67,000 will be released.

Mr. ANDERSEN. What are the chances that Mexico might adopt a program to stamp it out in that country?

Dr. SIMMS. The Mexican people have expressed an interest in the tick-eradication program. I was in Mexico 2 months ago, and the new Secretary of Agriculture there had a talk with me about the program of eradicating foot-and-mouth disease, and he said, "We hope we can continue the same sort of cooperation with your Government. We would like to put on a program for the control and eradication of ticks."

NEW EMPLOYEES FOR TICK-CONTROL PROGRAM

Mr. ANDERSEN. In relation to this increase, I wish you would list in the record at this point the number of new employees and proposed grades.

Also insert how much the various States are doing in this work, and whether they are requesting increases through their own legislatures?

Dr. SIMMS. Of course, there is a border problem in Texas, and Puerto Rico is putting in a large amount.

We will put that in the record.

(The information requested is as follows:)

PERSONNEL NEEDED FOR INCREASE ON TICK ERADICATION

TEXAS

1 GS–6 agent
22 GS–4 agents

One supervisor and 22 inspectors working under State laws, to ride pastures vacated in order to eradicate ticks to assure that they remain free of host animals, inspect animals, supervise dipping, and certify to movement of cattle and horses out of quarantined area.

Contributions of cooperators in tick-eradication program, fiscal year 1952

	Amount
Arkansas	$2,400
Florida	148,528
Puerto Rico	670,860
Texas	[1] 23,055

[1] Texas is free from ticks except in the quarantined area along the Rio Grande River, and except for outbreaks resulting from ticks escaping from that area.

INSPECTION SERVICE AT SEA AND AIRPORTS

Mr. ANDERSEN. Now, item No. 5, page 140 in your notes, indicates a large increase in the number of vessels arriving at United States ports with prohibited meats aboard. The increase is up to 12,115 in 1952.

Can you explain that increase, Doctor?

Dr. SIMMS. There are two reasons for this.

In the first place, the commerce itself has increased a great deal, not in the percentages as shown here but commerce has increased.

The second reason is that more and more of the ships are now carrying in their ship stores chilled and frozen meats, where back some several years ago they carried cured meats and canned meats. So, a higher percentage of the ships arriving have these prohibited meats aboard. There are two reasons for it.

Mr. ANDERSEN. To what extent have you considered changes in procedures and requirements as a means for meeting the inspection load?

Dr. SIMMS. We work very closely with the customs people and with the plant quarantine people at the ports. They assist us; they inspect materials that come in; they pick them up and hold them for us, if they come in by airplane, for instance. But it's just a question of having enough people to go around, enough people to do the job.

I will call attention to the fact that not only do we have a large increase in the number of ships that sail into our ports, but the number of airplanes that come in is constantly increasing, and we know from experience at the airports that a fairly good percentage of the people who come back from other countries may bring along with them something that would be dangerous to our livestock.

So it is necessary, if we are to give the protection that we should against such diseases as foot-and-mouth disease and rinderpest and so on, that we have inspection wherever international airports are maintained in this country.

Mr. ANDERSEN. Please include in the record at this point a statement on the additional personnel requested.

(Statement showing personnel applicable to proposed increase for inspection services is as follows:)

PERSONNEL NEEDED FOR INCREASE ON STRENGTHENED INSPECTION SERVICE AT SEA AND AIRPORTS TO GUARD AGAINST INTRODUCTION OF FOREIGN ANIMAL PLAGUES

Mobile, Ala.; Los Angeles, Calif.; San Francisco, Calif.; Pensacola, Fla.; Miami, Fla.; Savannah, Ga.; New Orleans, La.; New York, N. Y. (4); Portland, Oreg.; Philadelphia, Pa.; Houston, Tex.; Seattle, Wash.—To supervise handling of imported animal products and other materials which might harbor dangerous livestock diseases, investigate foreign meat products arriving at ports in passenger baggage or as ships stores to determine country of origin, oversee disposal when necessary including disposal of garbage arriving on ships or planes, inspect live animals and maintain quarantines when necessary, oversee cleaning and disinfection, issue certificates as required, etc.

2 GS–9 veterinarians (Miami, Fla., and New York, N. Y.)
15 GS–8 inspectors

SUPERVISION OF PRODUCTION OF HOG-CHOLERA VACCINES

Mr. ANDERSEN. In relation to item 6, the final item of increase, $30,000 is requested for supervision of production of hog-cholera vaccines. In 1953 you had $507,940 for the control of viruses, serums, and toxins. How is that amount of money used?

Dr. SIMMS. That appropriation that we have for this year and have had in the past is used in supervising the production of the various biological products which are produced in this country for use in the control, prevention, and treatment of diseases of domestic animals.

We maintain a very close supervision over those plants which produce hog-cholera serum and virus. We maintain not so close but nevertheless a supervision over all the establishments which produce such things as vaccines, toxins, and so forth. Every lot of hog-cholera antiserum that is produced is tested under our supervision. Before it goes out from the production point we have seen it actually tried out in hogs.

The request for additional funds is in connection with the new hog-cholera vaccine products that have come on the market within the last year and a half. They are produced in laboratories more or less separate from the ones that are producing the hog-cholera antiserum, and the only way we can have supervision over them is to have people there to see that they are produced properly and to see that each lot is tested properly.

Mr. ANDERSEN. Please include a breakdown of the personnel requested here.

(Statement showing personnel applicable to proposed increase for supervision of production of hog-cholera vaccines is as follows:)

PERSONNEL NEEDED FOR INCREASE FOR SUPERVISION OF PRODUCTION OF MODIFIED LIVE-VIRUS HOG-CHOLERA VACCINES

White Hall, Ill.; Kansas City, Mo.; St. Joseph, Mo.; Lincoln, Nebr.:
4 GS–9 veterinarians
Berkeley, Calif.; Omaha, Nebr.:
2 GS–7 virus-serum inspectors
To supervise manufacture of modified live-virus hog-cholera vaccine, including all phases of production, testing, and release of product.

POSSIBLE CHANGES IN POINTS OF INSPECTION

Mr. HORAN. Some of my stockyard people have expressed an interest in any possible changes in points of inspection on importation of livestock.

Dr. SIMMS. They are the people that want the inspection at the border instead of at Spokane?

Mr. HORAN. No; at Spokane instead of at the border.

Dr. SIMMS. Well, we have had requests both ways.

Mr. HORAN. Well, in order to have this clear, as it is now the inspection is made at the point of loading, isn't that true?

Dr. SIMMS. Usually yes; but we have allowed animals to go into Spokane for inspection in the past.

Mr. HORAN. Yes; I understood that, and as far as I know, it was a very efficient operation carried on there.

Dr. SIMMS. We are not contemplating any shift in this operation there, when the cattle begin to come in from Canada again.

Mr. HORAN. Now in Mexico you follow a little different procedure, do you not?

Dr. SIMMS. Yes. Of course in Mexico we give inspection at the border. Their cattle may come in with ticks on them unless properly inspected and dipped. We wouldn't move any ticky animals inland, as far as Spokane, before we gave inspections.

Mr. HORAN. Of course we are dealing with two different basic philosophies. You have indicated that Mexicans are just beginning to show an interest in this matter of protecting the consumer through the processes of government. I don't think the native Mexican is very much interested in foreign trade right now.

Dr. SIMMS. Well, I think that's true.

Mr. HORAN. It is increasing, as you have indicated, but an entirely different attitude exists with our Canadian cousins. They have entirely refused to accept any gifts in this participation in stamping out foot-and-mouth disease, which I think is entirely admirable. I think their livestock associations and their provincial governments are responsible.

So far I have been amazed at the economy we have had in regard to the inspection and border point of trade that flows between the two countries. It is one of those things we take for granted, I think. I think our customs and our immigration service in some cases are overdoing the cost of maintaining border ports. But at the same time I think I understand enough about the problem that you deal with to appreciate the fact that particularly in the eastern section of the country you have been able to maintain at least an effectual border patrol and inspection service at what appears to me to be a minimum of expenditure.

Dr. SIMMS. Of course we get very fine cooperation from the Canadian side. Otherwise, we couldn't do as good a job as we do.

MEAT INSPECTION

Mr. ANDERSEN. Dr. Simms, we now get into the subject of meat inspection.

Last year at the instigation of Mr. Whitten, then chairman, an investigation of the Meat Inspection Division was initiated, with particular reference to the provision inserted in 1952, staff assignments, possible duplication with the Army Veterinary Corps, and certain administrative matters. I believe this occurred last June.

The subcommittee has before it a rather detailed statement as to the results of this investigation, and it is my intention, Doctor, to furnish you a copy for your study. We will then expect you to furnish answers for further consideration of the committee.

Dr. SIMMS. Yes, we will be glad to do that.

Mr. ANDERSEN. Do you have any questions, Mr. Whitten?

Mr. WHITTEN. Mr. Chairman, I don't have any. I think you are handling this in the right way.

I want the record to show that all the reports from the investigations made last year when I was chairman have been turned over to the present chairman. I think perhaps before we conclude our hearings we might take up 2 or 3 of these investigation reports.

One of them was on the Commodity Credit Corporation activities. Another was on meat inspection and another on entomology and plant quarantine.

Mr. ANDERSEN. I have in mind, Mr. Whitten, that after we study the replies from Dr. Simms we will call them in for an executive session on the subject.

Gentlemen, do you have any questions relative to the general subject of meat inspection?

ADULTERANTS AND ADDITIVES TO FOOD

Mr. HORAN. We have had some turmoil in the general field of adulterants and additives to food, or anything that is deleterious to public health. We had a little problem brought up recently by the

so-called Cardiff case, in which he refused to allow Food and Drug inspectors to enter his premises, and of course the President mentioned it in his state of the Union speech.

Now some of us have our own ideas about what constitutes that which is deleterious, whether it is a residue, whether it is an additive or whether it is an adulterant.

In the case of pesticides, most of us in the fruit and vegetable industry feel that the Public Health Service has a pretty good background for determining what is, or is not, deleterious. I notice here that you have $189,000 for the determination of adulterations and other objectionable diseases of meat and meat food products for laboratory analysis. Is that correct?

Dr. SIMMS. Yes. Dr. Miller here is our man in charge of meat inspection. He can give you the details.

Mr. HORAN. In the case of seizure, you do that yourself and not the Food and Drug Administration?

Dr. MILLER. Yes, sir.

Mr. HORAN. And Food and Drug does not participate in your function?

Dr. MILLER. They do not participate directly in a controlled way. However, in arriving at our determinations as to whether some proposed chemical additive, let us say, might properly be used in a meat-food product, we consult with all authorities on this subject, including the Public Health Service, the Food and Drug Administration, and of course the talent from private industry.

Mr. HORAN. Now in the case of arsenical dips, is that licensed by the Department of Agriculture?

Dr. SIMMS. Arsenical dips are approved by the Bureau of Animal Industry. The ones that are used on livestock are used with our approval.

Mr. HORAN. I just wanted to get it straight.

ERADICATION OF FOOT-AND-MOUTH DISEASE AND OTHER CONTAGIOUS DISEASES OF ANIMALS AND POULTRY

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Transferred from—			
"Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," pursuant to Public Law 451		$190,000	
"Control of emergency outbreaks of insects and plant diseases, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration," pursuant to Public Law 451		500,000	
"Control of forest pests, Agriculture," pursuant to Public Law 451		172,800	
"Operating and administrative expenses, Federal Crop Insurance Corporation," pursuant to Public Law 451		552,200	
Adjusted appropriation or estimate		1,415,000	
Prior year balance reappropriated	$500,542	171,934	
Recovery of prior year obligations	14,348		
Reimbursements from Commodity Credit Corporation—loans	6,615,000	2,433,000	
Total available for obligation	7,129,890	4,019,934	
Balance reappropriated for subsequent year	−171,934		
Obligations incurred	6,957,956	4,019,934	

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
1. Cooperation with Government of Mexico in control, eradication, and prevention of foot-and-mouth disease	$4,282,237	$1,285,000	
2. Mexican border inspection and quarantine	1,958,352	740,000	
3. Inspection at public stockyards and in the field	383,095		
4. Research on foot-and-mouth disease	143,993		
5. Administrative cost of disposal of Mexican canned meats and meat products	612		
6. Protective measures to prevent entry of foot-and-mouth disease from Canada	189,667	579,934	
7. Eradication of vesicular exanthema of swine		1,400,000	
8. Eradication of scrapie of sheep		15,000	
Obligations incurred	6,957,956	4,019,934	

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Total number of permanent positions	1,264	768	
Full-time equivalent of all other positions	1	2	
Average number of all employees	1,035	412	
Average salaries and grades:			
General schedule grades:			
Average salary	$4,423	$4,487	
Average grade	GS-7.1	GS-7.3	
01 Personal services:			
Permanent positions	$4,152,236	$1,657,479	
Part-time and temporary positions	3,038	9,000	
Regular pay in excess of 52-week base	10,708	3,975	
Payment above basic rates	883,860	250,100	
Payments to other agencies for reimbursable details	7,775	3,500	
Total personal services	5,057,617	1,924,054	
02 Travel	291,750	253,300	
03 Transportation of things	50,224	94,900	
04 Communication services	10,091	9,500	
05 Rents and utility services	15,937	5,700	
06 Printing and reproduction	2,627	3,800	
07 Other contractual services	180,622	83,210	
Services performed by other agencies	7,641		
08 Supplies and materials	133,937	72,970	
09 Equipment	6,114	3,000	
13 Refunds, awards, and indemnities:			
Scrapie indemnities		15,000	
Vesicular exanthema indemnities		1,388,000	
Payments to Mexican-United States Commissions for the Eradication and Prevention of Foot-and-Mouth Disease	1,155,000	150,000	
Federal tort claims	278		
15 Taxes and assessments	46,401	16,500	
Subtotal	6,958,239	4,019,934	
Deduct charges for quarters and subsistence	283		
Obligations incurred	6,957,956	4,019,934	

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$844,724	$882,109	$51,243
Obligations incurred during the year	6,957,956	4,019,934	
	7,802,680	4,902,043	51,243
Deduct:			
Reimbursement from Commodity Credit Corporation	6,615,000	2,433,000	
Adjustment in obligations of prior years	14,348		
Unliquidated obligations, end of year	882,109	51,243	
Total expenditures	291,223	2,417,800	51,243
Expenditures are distributed as follows:			
Out of current authorizations		1,535,700	
Out of prior authorizations	291,223	882,100	51,243

Eradication of foot-and-mouth and other contagious diseases of animals and poultry, Agricultural Research Administration

	Eradication of foot-and-mouth disease	Eradication of vesicular exanthema of swine	Eradication of scrapie of sheep
Notes canceled, 1953, covering advances made and expenses incurred by Commodity Credit Corporation through June 30, 1951	$11,240,252		
Transfers for eradication of vesicular exanthema of swine and scrapie of sheep from—			
"Salaries and expenses, Bureau of Animal Industry"		$175,000	$15,000
"Control of emergency outbreaks of insects and plant diseases, Bureau of Entomology and Plant Quarantine"		500,000	
"Control of forest pests, Agriculture"		172,800	
"Operating and administrative expenses, Federal Crop Insurance Corporation"		552,200	
Base for 1954	11,240,252	1,400,000	15,000
Budget estimate, 1954	[1] 7,057,575	(1)	

[1] Notes to be canceled to cover unreimbursed expenses and transfers from Commodity Credit Corporation through June 30, 1952, including interest thereon from July 1, 1952, through June 30, 1953.

EXPLANATION OF ESTIMATE

Eradication of foot-and-mouth disease

OBLIGATIONS, 1952

(For which cancellation of notes is requested in 1954 budget estimates)

1. Cooperation with the Government of Mexico in the control and eradication of foot-and-mouth disease:		
Payments made to the Mexican-United States Commission for the eradication of foot-and-disease in Mexico	$1,155,000	
Direct Federal expenses for program in Mexico	3,127,237	
		$4,282,237
2. Enforcement of Mexican-border quarantine		1,958,352
3. Inspection at public stockyards and in the field		383,095
4. Research on foot-and-mouth disease		143,993
5. Canned-meat and meat-products program:		
Administrative costs		612
Handling expenses in connection with disposal of canned meat purchased in northern Mexico paid directly by the Commodity Credit Corporation		15,958
6. Protective measures to prevent entry of foot-and-mouth disease from Canada		189,667
7. Interest on advances made prior to June 30, 1952		303,002
Total obligations		7,276,916
Less receipts from sales of canned meat and meat products and prior year adjustments		−16,638
Prior year balance available in 1952		−514,890
1952 balance available in 1953		+171,934
Total due June 30, 1952		6,917,322
Estimated interest through June 30, 1953, on prior year advances		140,253
Total, notes to be canceled		7,057,575

ESTIMATED OBLIGATIONS, 1953

(For which funds will be required in fiscal year 1955 to reimburse Commodity Credit Corporation)

1. Cooperation with the Government of Mexico in the control, eradication, and prevention of foot-and-mouth disease in Mexico:		
Payments to joint commissions:		
(*a*) Eradication Commission (including liquidation costs)	[1] $61,000	
(*b*) Prevention Commission (September 1, 1952–June 30, 1953)	43,000	
		104,000
Direct Federal expenses:		
(*a*) Eradication program	678,000	
(*b*) Prevention program	457,000	
		1,135,000
		1,239,000
2. Mexican-border inspection and quarantine		740,000
3. Protective measures to prevent entry of foot-and-mouth disease from Canada		[2] 579,934
4. Interest		[3] 87,000
Total obligations		2,645,934
Less 1952 balance available in 1953		−171,934
Total estimated costs, 1953		[4] 2,474,000

[1] Revised estimate. Budget included $107,000 estimated obligations for this purpose.
[2] Estimate based on no further outbreaks of disease in Canada and lifting of quarantine Mar. 1, 1953.
[3] Includes estimated interest through June 30, 1954, on fiscal year 1953 advances.
[4] Actual reimbursement to Commodity Credit Corporation will take into account return of balances in Commission accounts upon final liquidation.

STATUS OF PROGRAM

(*1*) *Cooperation with the Government of Mexico in the control and eradication of foot-and-mouth disease*

History and development.—The existence of foot-and-mouth disease in Mexico was confirmed December 26, 1946. Legislation authorizing the Secretary of Agriculture to cooperate with the Government of Mexico to eradicate, suppress, or control the outbreak was approved February 28, 1947 (21 U. S. C. 114b–c–d). The Mexican-United States Commission for the Eradication of Foot-and-Mouth Disease was established through an exchange of diplomatic notes between the two Governments on March 17 and 18, 1947. The first appropriation ($9,000,000) for cooperative work with Mexico was approved March 27, 1947. Commission offices were established in Mexico City on April 10, 1947.

The original plan of eradication included the slaughter and burial of infected and exposed animals, the maintenance of quarantines, and disinfection operations—practically the same methods that had been used with success during outbreaks in the United States. Some modifications were necessary to meet Mexican conditions and customs. For instance, since oxen are the chief draft animals in Mexico and since large numbers of them were affected with the disease, it became necessary to establish a program of replacing slaughtered oxen with mules. This was to enable food production on Mexican farms to continue. The plan of eradication provided for the payment of indemnities, based on fair appraised value, for all cattle, swine, sheep, and goats destroyed. United States and Mexican veterinarians, technicians, appraisers, and paymasters generally worked in pairs under the direction of the Joint Commission. The Mexican National Army aided the campaign by providing protective services and quarantine enforcement.

Slaughtering operations were going forward at the rate of about 50,000 animals a week in November 1947 yet the spread of the disease to new areas showed that local quarantine restrictions were not being enforced. A strong sentiment was developing among the Mexican people and their officials for a change to a less drastic program. An appraisal at that time indicated that a continuation of the plan, without modification, to eradicate the disease from Mexico might mean the destruction of between 4,500,000 and 5,000,000 cattle and a similar number of swine, sheep, and goats. Mexican officials presented to the Commission their conclusion that the country could not stand the economic shock of this wholesale destruction.

After detailed study of the program, the Joint Commission agreed to a change, effective November 26, 1947. The principal features of the revised program as agreed upon at that time included:

(*a*) Strengthening quarantine enforcement, particularly the lines at the northern and southern boundaries of the main infected area.

(*b*) Conducting extensive inspections to determine where infection existed.

(*c*) Prompt disposal, by slaughter, of infected and directly exposed animals in centers of active infection located in the work areas.

(*d*) Cleaning and disinfection of premises, of trucks, cars, and other things that had been exposed to disease and might harbor the virus, and

(*e*) Vaccination of healthy susceptible animals to build up their resistance to the disease.

The Department also undertook to furnish a market outlet for cattle in northern Mexico in the form of canned meat, as a precautionary measure to prevent spread of foot-and-mouth disease to northern Mexico and the United States. This program was initiated following recommendations by the Department Industry Advisory Committee on Foot-and-Mouth Disease and by members of the Subcommittees on Foot-and-Mouth Disease of both Houses of Congress who visited Mexico. All operations connected with the disposition of canned meat and meat products purchased in northern Mexico were concluded in the fiscal year ending June 30, 1952; 216.5 million pounds were purchased under this appropriation item. Proceeds from sales of meat, less handling charges, were applied against amounts transferred to this appropriation item from the Commodity Credit Corporation, together with recoveries from Mexican meat-packing plants for inspection services.

Mass vaccinations were completed by July 31, 1950, with only a small number of cleanup vaccinations thereafter until cessation of the vaccination program in October 1950. Vaccinations totaled 60,130,189. The Joint Commission produced 53,324,000 doses of vaccine in Mexico (represents full doses for cattle—one-half this dose was used for small animals); 1,644,619 doses were purchased from Arzentina, Denmark, the Netherlands, and Switzerland.

Quarantine lines were maintained across Mexico at the northern and southern extremities of the previously infected area to prevent movement from it of susceptible animals and materials which might harbor the virus of foot-and-mouth disease.

Repeated inspections were made throughout the quarantined area of as many susceptible animals as possible. When suspected cases of foot-and-mouth disease were encountered thorough inspections were made, including laboratory tests when necessary. After the last outbreak in August 1951, all were found to be some condition other than foot-and-mouth disease, the condition most frequently proving to be vesicular stomatitis, a disease affecting cattle and horses with symptoms very closely resembling foot-and-mouth disease.

Present outlook: On September 1, 1952, Mexico was declared free of foot-and-mouth disease. The Mexican-United States Commission for the Eradication of Foot-and-Mouth Disease was superseded by the Mexican-United States Commission for the Prevention of Foot-and-Mouth Disease. For the most part United States personnel have been returned to this country. A sufficient staff (35 as of November 30, 1952) has been retained in Mexico to maintain strict vigilance so that if the disease should reappear there can be maximum assurance that it will not gain a strong foothold. The new Commission is cooperative, with one-half of the cost to be contributed by each country. It has been financed by an initial payment of 300,000 pesos by each country with subsequent contributions as necessary to be on a 50–50 basis.

Mexican livestock owners have been asked to report all disease symptoms resembling foot-and-mouth disease to a central office in each State. American and Mexican workers investigate these reports and laboratory tests are made when necessary.

In the fiscal year 1954 the force will be reduced to about three veterinarians and the estimates for "Salaries and expenses, Bureau of Animal Industry, animal disease control and eradication" include a recommendation for $40,000 to finance this activity under the project "Determining the existence of diseases in the field."

(*2*) *Mexican border inspection and quaratine*

Prior to September 1, 1952, when Mexico was declared free of foot-and-mouth, the border patrol force along the United States-Mexican border enforced the prohibition against the entry of animals susceptible to foot-and-mouth disease, and prohibitions and restrictions applicable to products and materials which might carry the virus. The border patrol work was carried on in close cooperation

with the Bureau of Customs and other Federal agencies operating along the border. More than 80 key members of the Bureau force were designated as customs agents, thus permitting closer working relationship and avoidance of duplication of patrol forces along the border.

On September 1, the border-patrol force, as such, totaling 253 employees, was discontinued. Since that date, the Mexican border activities have been carried out by a force of less than 50. Strict inspections are made of ruminants, swine, equines, and poultry offered for importation from Mexico, investigations are conducted of smuggled animals and inspections made of stray animals to prevent the entry of livestock diseases into the United States. Supervision and control are exercised over certain animal products and materials, such as hay and straw, which are brought into this country from Mexico to make certain they comply with the governing import regulations.

In fiscal year 1954 it is planned to finance this import inspection and quarantine work from "Salaries and expenses, Bureau of Animal Industry, animal disease control and eradication," under the project "Import-export inspection and quarantine" and a direct appropriation has been recommended for this work. Expenses of the border force would be reduced by July 1, 1953, to a level of $290,000 per annum.

(3) Protective measures to prevent entry of foot-and-mouth disease from Canada

On February 25, 1952, the Department was notified by officials of the Canadian Ministry of Agriculture that foot-and-mouth disease had made its appearance in the vicinity of Regina, Saskatchewan. The Bureau immediately instructed its inspectors at border and ocean ports to halt inspections of Canadian ruminants and swine and to take every precaution to prevent entry of such animals and fresh, chilled, or frozen meats derived therefrom as well as other animal products and materials which might harbor the virus. On February 26 the Secretary of Agriculture took official action to prohibit these importations in accordance with, section 306 (a) of the Tariff Act of 1930.

The disease first appeared in Canada late in November 1951. However there had been delay in diagnosis of the disease because it was thought to be vesicular stomatitis. In February 1952 an official of the Bureau assisted in the final diagnosis. The disease later appeared in areas around Ormiston and Weyburn, Saskatchewan. The eradication procedures applied by Canadian authorities involved slaughter and burial of infected animals; cleaning, disinfection, and quarantine of premises; and subsequent use of test animals to determine effectiveness of cleaning and disinfection procedures. An official of the Bureau was detailed to Canada as an observer at the invitation of the Canadian Government. The last outbreak of the disease occurred in April 1952.

Extensive trade between Canada and the United States has presented many serious problems, more so than along the Mexican border. Truck- and rail-transportation routes often cross and recross the international borders. The disease ranged only from 50 to 60 miles from the United States border in Montana and North Dakota. Many urgent requests were made by States and livestock interests for special protective measures. Veterinarians and lay assistants of the Bureau were assigned to enforce import quarantines. A much smaller force was able to handle the work than along the Mexican border where patrol had to be maintained. Less than 100 Bureau employees have covered the entire border, with most of them being assigned to that part of the border between the Pacific Ocean and the Great Lakes. Additional Bureau veterinarians were given special training in diagnosing vesicular diseases which are clinically similar to foot-and-mouth disease in order to provide a sufficient number for diagnosis of suspected cases of the disease. Such diagnosticians now total 47.

Canadian officials announced on August 19, 1952, that foot-and-mouth disease in that country was eradicated but it was believed that insufficient time had elapsed to make a determination, as required by law, that the virus no longer existed in Canada. However, it presently appears likely that the Department may be in position to proclaim Canada free from the disease March 1, 1953. Canadian border-import activities would then include the usual strict inspection of ruminants, swine, equines, and poultry offered for importation from Canada. Certain animal products and materials which are brought into this country from Canada would also be subject to restrictions to make certain they comply with the governing import regulations. Included in this work is supervision over sea-store meat and garbage derived from such meat aboard vessels in the Great Lakes.

(4) Current foot-and-mouth disease situation

Following the diagnosis of foot-and-mouth disease in Mexico in December 1946, the Department cooperated with the Mexican Government in an eradication

program there. This work was authorized by the act of February 28, 1947. The Mexican-United States Commission for the Eradication of Foot-and-Mouth Disease was organized late in March 1947 to conduct the program. Each Government detailed employees to assist the joint commission and furnished operating funds, supplies, and materials, etc. Equipment was loaned by the United States Government for use there. On September 1, 1952, the Secretary of Agriculture declared Mexico free from foot-and-mouth disease, and the Mexican-United States Commission for the Prevention of Foot-and-Mouth Disease was established to succeed the Eradication Commission which was liquidated. Under the prevention commission veterinarians are assigned to investigate promptly all reported cases of animal diseases resembling foot-and-mouth disease. As of January 31, 1953, a total of 86 employees were assigned to the Commission as follows: American section, 32; Mexican section, 30; and Joint Commission, 24. During the month, 73 veterinary investigations were made in Mexico, 4 of which were diagnosed as vesicular stomatitis, a disease very closely resembling that of foot-and-mouth disease.

Foot-and-mouth disease was declared to exist in Canada on February 25, 1952. At the invitation of the Canadian Government, an observer was sent to Canada where he spent most of his time in and around Regina, Ormiston, and Weyburn, Saskatchewan, at which places the disease existed in that country. Following a declaration of emergency by the Secretary of Agriculture of the United States because of the existence of foot-and-mouth disease in Canada, special funds were made available to strengthen the enforcement of the Canadian border quarantine imposed when the disease was first reported in that country. A total of approximately 15 veterinarians and 80 quarantine-enforcement inspectors were assigned to duty along the nearly 4,000 miles of land and water boundary between the United States and Canada. Duties of these men were to contact residents along the border in both countries, Customs officials, immigration officials, State authorities, brokers, and other interested persons concerning the prohibitions and restrictions imposed because of the existence of foot-and-mouth disease in Canada and to enforce the prohibition against the importation of domestic ruminants and swine, and beef, veal, mutton, lamb, or pork, as provided in the governing statute, section 306 (a) of the Tariff Act of 1930.

The last known occurrence of foot-and-mouth disease in Canada was in the latter part of April 1952. These animals were destroyed and buried early in May of that year. On March 1, 1953, the Secretary of Agriculture of the United States declared Canada free of foot-and-mouth disease and the services of the quarantine-enforcement inspectors were discontinued as of that date. As of March 7, 1953, only a few hundred animals have been imported; however, it is anticipated approximately 100,000 will be received within the next 4 to 5 months.

In November 1952 the Bureau received information from the consul at Fort de France that foot-and-mouth disease had been found to exist in the Island of Martinique. At the present time no information has been received as to its occurrence in other Caribbean Islands although it has been necessary to strengthen the quarantine-enforcement activities of United States possessions in that area.

Since November 15, 1950, foot-and-mouth disease has occurred in several countries which previously were considered free of the disease by the Secretary of Agriculture of the United States. These countries include, Colombia, the Union of South Africa, Norway, Canada, Channel Islands, and Martinique. The main countries of the world which presently are free of foot-and-mouth disease or rinderpest are, the United States, New Zealand, Australia, Greenland, Iceland, Canada, Mexico, and the Central American countries.

During the past year or so foot-and-mouth disease has run rampant through Europe, and officials in those countries have been unable to stop the spread of the disease across the continent. Recent information received by the Bureau indicates that the disease is more or less constantly appearing in those countries. It is believed that the Department must increase its vigilance at land and water boundaries if it is to fulfill its responsibility to the livestock industry of the country in preventing the entrance of devastating foreign diseases into the United States.

STATUS OF FOOT-AND-MOUTH DISEASE IN MEXICO

Mr. ANDERSEN. Dr. Simms, before we conclude today, I should like to have a few comments in the record relative to the foot-and, mouth situation. What is the latest picture with resepct to the disease in Mexico?

Dr. SIMMS. Mexico has had no foot-and-mouth disease insofar as we know since August 1951. The last outbreak prior to that was in

December 1950. So if we go back 2 years, Mexico has had only 1 outbreak.

Mr. ANDERSEN. When were the latest vaccinations made?

Dr. SIMMS. We stopped vaccinating in Mexico about August 1950. Isn't that right, Dr. Clarkson?

Dr. CLARKSON. Yes, sir.

Mr. ANDERSEN. That seems to indicate that it's getting pretty well cleaned up.

Dr. SIMMS. We think there is no reason to believe there is any foot-and-mouth disease in Mexico at the present time.

Since we saw the last outbreak in August 1951, we have continued a very active inspection program that covered the entire area where the disease had been present. We had a large force of inspectors for a while and we continued that large force until last summer. The first of last September, the Secretary declared that Mexico was free from foot-and-mouth disease, and when that declaration was made we decreased the size of our force very materially. We still have a small force in Mexico.

Mr. ANDERSEN. If I recall correctly, Doctor, you opened up the border on September 1.

Dr. SIMMS. That's correct. Then we decreased the size of the inspection force very materially, but we still have about 30 people there.

I was down there 2 months ago. I went for the specific purpose of seeing what they were doing in the field, what they were doing in the local offices. The attitude on the part of the Mexican people is wonderfully good. Our people who have worked in the field as inspectors have more or less become a part of the community now. If you go with one of them to a municipio you can see the presidente of the municipio greet him as a friend.

Many of the Mexican cattle owners and officials of the State government—I am not speaking of the National Government now, but right out in the field where the people are working—expressed an appreciation of the work that has been done in the eradication of the disease.

COST OF PROGRAM IN MEXICO

Mr. ANDERSEN. What has been the total bill, as far as our Treasury is concerned, with the Mexican foot-and-mouth-disease program?

Dr. SIMMS. The total cost for the Bureau's activities has been about $102 million, and then the canned-meat activity ran about another $25 million or $26 million.

Mr. ANDERSEN. Your first figure was $102 million?

Dr. SIMMS. Yes, sir, through January 31, 1953, exclusive of the meat-purchase program and interest costs. The net total was about $127 million.

Mr. ANDERSEN. That is since the beginning?

Dr. SIMMS. Since the beginning; yes. It started in 1947. That includes all of the work that was done in Mexico, the cost of the Mexican border patrol, and the cost of research work that we did in European laboratories during that time.

Mr. ANDERSEN. And that is a total of approximately $130 million?

Dr. SIMMS. That's right.

Mr. ROBERTS. Mr. Chairman, there are tables on pages 580a and 580b of the justification notes which indicate the total costs of this program. You may wish to include them in the record.

Mr. ANDERSEN. Thank you, Mr. Roberts. We will insert these pages in the record at this point.

(The material referred to is as follows:)

Control, eradication, and prevention of foot-and-mouth disease in Mexico—Obligations and funds provided as of Dec. 31, 1952

	Fiscal year 1947-51 (accumulative)	Fiscal year 1952	Fiscal year 1953 (as of Dec. 31, 1952)	Total
OBLIGATIONS				
Control and eradication activities:				
Payments made to the Mexican-United States Commission for the Eradication of Foot-and-Mouth Disease in Mexico and successor Commission	$54,855,000	$1,155,000	$37,988	$56,047,988
Direct Federal expenses for program in Mexico	27,255,949	3,127,237	771,243	31,154,429
Enforcement of Mexican-border quarantine	10,197,114	1,958,352	535,516	12,690,982
Inspection at public stockyards and in the field to detect immediately any possible introduction of foot-and-mouth disease into the United States	874,532	383,095		1,257,627
Short-term research on foot-and-mouth disease	797,802	143,993		941,795
Total	93,980,397	6,767,677	1,344,747	102,092,821
Meat-purchase program in northern Mexico:				
Purchase of canned meat and meat products in northern Mexico	56,173,509			56,173,509
Administrative expenses incident to meat purchase	443,534	612		444,146
Handling charges (canned meat)	3,295,590	15,958		3,311,548
Total	59,912,633	16,570		59,929,203
Interest on funds borrowed from CCC	1,679,322	307,523	82,162	2,064,007
Total obligations	155,572,352	7,086,770	1,426,909	164,086,031
Deduct application of gross receipts from sales of canned meat and from inspection fees [1]	−36,899,380	−16,638		−36,916,018
Net total obligations (net of receipts from sale of meat)	118,672,972	7,070,132	1,426,909	127,170,013
FUNDS PROVIDED				
By CCC:				
Gross transfers of funds	135,265,000	6,405,000	1,438,399	143,108,399
Interest costs on funds transferred; and handling charges, canned meat	4,974,912	318,481	82,162	5,375,555
Total	140,239,912	6,723,481	1,520,561	148,483,954
Transfers available in subsequent years	−514,890	+363,289	+151,601	
Net total	139,725,022	7,086,770	1,672,162	148,483,954
Less—				
Application of gross receipts from sales of canned meat and from inspection fees [1]	−36,899,380	−16,638		−36,916,018
Repayment of funds transferred from appropriations therefor	−59,400,000			−59,400,000
Cancellation of Commodity Credit Corporation notes authorized by 1952 and 1953 Department of Agriculture Appropriation Acts	−43,425,642	−514,890		−43,940,532
Unreimbursed transfers		6,555,242	1,672,162	8,227,404
By appropriations and cancellations of notes	118,730,642	514,890		119,245,532
Net total funds provided	118,730,642	7,070,132	1,672,162	127,472,936
Unobligated balances:				
Not available in subsequent year; transferred to Treasury	−57,670			−57,670
Available as of date of report			−245,253	−245,253
Totals	−57,670		−245,253	−302,923
Net total obligations (as above)	118,672,972	7,070,132	1,426,909	127,170,013

[1] Gross receipts are reflected herein as applications in the fiscal year in which the sales contracts were executed. 1952 amounts represent sales and adjustments of sales applicable to prior year's contracts.

STATUS OF DISEASE IN CANADA

Now, what is the situation in Canada, Dr. Simms?

Dr. SIMMS. Canada has been declared free of foot-and-mouth disease, and there is no longer any quarantine in Canada for cattle.

In Canada they had infection on only about 25 or 30 premises. All of the animals on those premises were killed and buried. The premises were cleaned and disinfected. Then test animals were placed on them. The last infected animals were found in April of last year.

Mr. ANDERSEN. When do you anticipate opening up the border?

Dr. SIMMS. It's already opened. It was opened March 1.

MEXICAN CONTRIBUTION TO COST OF CONTROL PROGRAM

Mr. HUNTER. Is it possible, Doctor, to estimate the amount of money that the Mexican Government spent during the same period of time for the eradication of foot-and-mouth disease? You mentioned the total spent by the United States since 1947, and I wondered whether it would be possible to estimate the amount of money spent by Mexico.

Dr. SIMMS. I think it would be very difficult to estimate the cost to the Mexican Government. They assigned soldiers to this work. They had soldiers in the Army anyway and they assigned them for quarantine officers. In every discussion we had they would charge these soldiers up at a fairly big price.

We can get the figures as to the amount of cash that they put in there.

Mr. HUNTER. Would it be in terms of effort, or manpower, man-hours?

Dr. SIMMS. The amount of cash wouldn't represent anything like all of the Mexican expenditures, and it would really not put them in as favorable a light as they should occupy.

METHOD OF FISCAL ACCOUNTABILITY FOR FUTURE CONTROL PROGRAM

Mr. ANDERSEN. Mr. Roberts, is it necessary to continue to carry this appropriation item relative to foot-and-mouth disease?

Mr. ROBERTS. We contemplate, Mr. Chairman, that at the end of the current fiscal year there will be no further foreseeable need to use this appropriation for advances on the foot-and-mouth disease program. Any costs incident to the foot-and-mouth disease, after July 1, will be small, and in case we keep a man or two down there, they will be paid from the regular BAI appropriation.

There will be in the appropriation estimates for the fiscal year 1955, however, a sum to repay CCC for advances made during the current fiscal year.

Mr. HORAN. That would be a capital investment repayment?

Mr. ROBERTS. It might be through cancellation notes as it has been in past years.

Mr. ANDERSEN. Might we drop this language that appears on page 230 of the committee print then?

Mr. ROBERTS. If you are referring to the transfer authority, Mr. Andersen, it would not be desirable to do so. That is considered to be a more or less continuing emergency authority, in case an outbreak of any of the diseases of that character occur. That is the authority

we used to transfer funds for the VE disease this year. It is also the authority we used to make a small transfer for the eradication of scrapie disease in California last fall.

USE OF FILMS AND MOTION PICTURES

Mr. ANDERSEN. What work, Doctor, have you done in your organization relative to films and motion pictures?

Dr. SIMMS. We do some work with motion pictures, in connection with depicting progress that we are making in this, or the other fields of the Bureau. For instance, we have a film that has been very widely distributed, and incidentally, we won an international prize with it, called The Triple Threat. It is a picture on brucellosis in livestock. It has been used very widely in our brucellosis eradication program.

We have another picture on foot-and-mouth disease, termed "Outbreak."

We have one underway now on ticks in cattle, and we are making one on tuberculosis in poultry.

Mr. ANDERSEN. Now how are these films utilized?

Dr. SIMMS. These films are distributed both through the Washington office and the State offices; the State extension services in each State have a copy of this film. So, for instance, if somebody in Tennessee or Idaho wants a film, they can write their State.

Mr. ANDERSEN. There will be a general fund of knowledge available through this means?

Dr. SIMMS. They are available to anybody and everybody who wants them. They go out mainly through extension agents and through livestock organizations.

STATUTORY AUTHORITY

Mr. ANDERSEN. Doctor, we will want placed in the record at this point your statutory authority for the various divisions of your work. And in each case indicate whether it's mandatory or permissible.

Dr. SIMMS. Yes, sir.

(The information requested follows:)

STATUTORY AUTHORITIES BY ACTIVITIES FOR WORK OF THE BUREAU OF ANIMAL INDUSTRY

APPROPRIATED FUNDS

Salaries and Expenses; Eradication of Foot-and-Mouth Disease and Other Contagious Diseases of Animals and Poultry; and Research Facilities.

RESEARCH—PERMISSIVE LEGISLATION

Acts of May 15, 1862, and February 9, 1889, establishing Department of Agriculture and authorizing experimental work.

Act of May 29, 1884, establishing the Bureau of Animal Industry and authorizing investigation of communicable diseases of domestic animals and live poultry and inquiry into means of their prevention and cure. Amended by act of April 24, 1948, authorizing establishment of facilities for research on foot-and-mouth and other diseases and forbidding experimentation with the live virus of foot-and-mouth disease on the mainland of the United States except in case of an outbreak of the disease in this country.

Act of June 29, 1935, as amended by the Research and Marketing Act of 1946, providing for research into laws and principles underlying basic problems of agriculture.

Act of April 30, 1946, transferring research on domestically raised fur-bearing animals to the Secretary of Agriculture and classing them as domestic animals.
Act of February 28, 1947, authorizing research laboratories necessary to carry out cooperatively the eradication of foot-and-mouth disease in Mexico.
Act of June 16, 1948, providing for increased research relating to eradication of cattle grubs.

ANIMAL DISEASE CONTROL AND ERADICATION

Field control and eradication activities are permissive. Import, export, public stockyards, 28-hour law, and virus-serum control activities are mandatory.
Acts of May 29, 1884, August 30, 1890, February 2, 1903, and March 3, 1905, as amended, authorizing control and eradication of animal diseases, and prohibiting importation, exportation, or interstate shipments of diseased animals, authorizing quarantines, etc.
Act of March 3, 1891, as amended, to provide for safe transportation and humane treatment of export livestock.
Act of June 29, 1906 (28-hour law), to prevent cruelty to animals while in transit.
Act of May 26, 1910, to permit erection of fences along international boundary lines to keep out diseased animals.
Act of March 4, 1913, to regulate the preparation, sale, barter, exchange, or shipment of any virus, serum, toxin, or analogous product manufactured in the United States and the importation of such products intended for use in treatment of domestic animals.
Tariff act of 1930:
Section 306, prohibiting importation of domestic ruminants and swine or fresh chilled or frozen meat therefrom from countries where foot-and-mouth disease or rinderpest exists.
Section 201, paragraph 1606, providing for free entry of purebred animals imported for breeding purposes.
Act of August 24, 1935 (secs. 56–60), for maintenance of adequate supply of hog cholera virus and anti-hog-cholera serum by regulating marketing in interstate or foreign commerce and to prevent undue and excessive fluctuations, unfair methods of competition, and unfair trade practices in such marketing.
Act of September 21, 1944, as amended, authorizing cooperation with States for improvement of poultry, etc. This work is carried out under the national poultry and turkey improvement plans.
Act of April 30, 1946, classing domestically raised fur animals as domestic animals and transferring activities to Department of Agriculture.
Act of February 28, 1947, providing for cooperation with Mexico in control and eradication of foot-and-mouth disease and rinderpest.
Act of June 16, 1948, providing for eradication of cattle grubs.

MEAT INSPECTION—MANDATORY LEGISLATION

Act of March 4, 1907, as amended.

TRUST FUNDS—PERMISSIVE LEGISLATION

Title II of the Research and Marketing Act of 1946. Inspection and certification of animal foods upon application of interested party.
Act of August 30, 1890. Feed and attendants for animals held in quarantine (in use at Federal quarantine station at Clifton, N. J.).

RESPONSIBILITY FOR PHOTOGRAPHIC WORK

Mr. HUNTER. Who does your photography? Do you have your own photographer in the Bureau, or is there a Department photographer?

Dr. SIMMS. In some instances we have done a small amount of the work ourselves. As a matter of fact, I have done a few motion pictures myself. They are very easily distinguishable, however, from those made by the professionals.

But there is a Motion Picture Division in the Department of Agriculture, rather than each Bureau having a motion-picture staff of its own.

However, as I said, in some instances where a man is in the field and is an amateur photographer, he takes along a camera and does a little bit himself.

Mr. ROBERTS. There is also a central photograhic laboratory, Mr. Hunter, that serves all of the Bureaus of the Department.

Dr. SIMMS. Yes; all of the really serious work is done in this central laboratory.

Mr. Hunter. We have had difficulty where the photographer knows nothing about the subject matter, and then again, the party that knows something about the subject matter knows nothing about photography.

Dr. SIMMS. Yes; that's always a problem, where the photographer knows nothing about what you are trying to depict, and he is interested more about good composition than showing the disease.

Mr. BUTLER. We do have one photographer we share with the Bureau of Dairy Industry. He takes stills needed in day-to-day use and activities.

NEED FOR DISTRIBUTION OF RESEARCH INFORMATION

Mr. WHITTEN. I am glad you brought out these statements about these services. One of the things that has been hard to get over to the Congress and the public since I have been on this committee is what the informational services of the Department are and do. Frequently in times past there have been attacks meant to be directed at press releases by employees of the Department which got into the field of political controversy. Those not knowing the difference tried to include all information services. As a result of that we have frequently had a lot of unwarranted attacks on distribution of the results of research and every other kind of knowledge in the Department.

I wish we could come up with terms which would distinguish one of them from the other, in the press and elsewhere. Certainly I don't want to see any restriction on the use of motion pictures and other things which get this story over so much better than we were able to do it. Of course, we have to show some reasonable attention to cost, and they have been very, very reasonable, judging by all standards.

I just mention that because as we go along we must make an effort to get the benefits of this great Department out as cheaply as we can and as effectively as we can. Now, in doing that, we do not have any objection to them cutting out a lot of other things, which is really what they have been after.

Mr. ANDERSEN. As you have said so often in this subcommittee, Mr. Whitten, unless we make research available to the people who can make use of it, there is no use appropriating millions of dollars yearly in the Department of Agriculture for such research. But, at the same time, we must prevent giving out information about research which might be classified as political.

We have had a very interesting discussion, gentlemen, and thank you very much.

WEDNESDAY MARCH 11,1953.

BUREAU OF DAIRY INDUSTRY

WITNESSES

DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION
DR. O. E. REED, CHIEF, BUREAU OF DAIRY INDUSTRY
DR. R. E. HODGSON, ASSISTANT CHIEF, BUREAU OF DAIRY INDUSTRY
M. M. KIRKHAM, ASSISTANT CHIEF, BUREAU OF DAIRY INDUSTRY
DR. G. E. HOLM, HEAD, DIVISION OF DAIRY PRODUCTS RESEARCH, BUREAU OF DAIRY INDUSTRY
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

SALARIES AND EXPENSES

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$1,570,000	$1,572,755	$1,815,000
Reimbursements from non-Federal sources	94	300	300
Reimbursements from other accounts	320		
Total available for obligation	1,570,414	1,573,055	1,815,300
Unobligated balance, estimated savings	−7,821		
Obligations incurred	1,562,593	1,573,055	1,815,300
Comparative transfer from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	18,000	17,300	
Total obligations	1,580,593	1,590,355	1,815,300

NOTE.—Reimbursements from non-Federal sources are from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Dairy cattle breeding, feeding, and management	$571,106	$566,400	$566,400
2. Nutrition and physiology	379,615	376,600	376,600
3. Dairy herd improvement	291,309	296,355	421,300
4. Dairy products research	315,154	326,700	426,700
5. Administration of the Process Butter Act	22,995	24,000	24,000
6. Obligations under reimbursement from non-Federal sources	94	300	300
Total direct obligations	1,580,273	1,590,355	1,815,300
Obligations Payable Out of Reimbursements From Other Accounts			
3. Dairy herd improvement	320		
Total obligations	1,580,593	1,590,355	1,815,300

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Total number of permanent positions	296	276	338
Full-time equivalent of all other positions	5	3	3
Average number of all employees	276	273	329
Average salaries and grades:			
General schedule grades:			
Average salary	$4,433	$4,477	$4,263
Average grade	GS–6.1	GS–6.2	GS–5.7
Ungraded positions: Average salary	$2,144	$2,233	$2,233
Direct Obligations			
01 Personal services:			
Permanent positions	$1,077,108	$1,107,000	$1,297,500
Part-time and temporary positions	13,131	5,500	5,000
Regular pay in excess of 52-week base	4,500	4,000	5,000
Payment above basic rates	13,500	13,000	13,000
Payments to other agencies for reimbursable details	3,409	500	
Total personal services	1,111,648	1,130,000	1,320,500
02 Travel	9,226	9,200	11,200
03 Transportation of things	3,160	3,200	3,700
04 Communication services	5,151	5,200	5,400
05 Rents and utility services	35,494	35,500	38,000
06 Printing and reproduction	40,062	40,000	40,000
07 Other contractual services	25,644	25,600	25,600
Services performed by other agencies	138,809	138,100	141,300
08 Supplies and materials	198,580	194,655	207,000
09 Equipment	14,683	14,900	28,600
15 Taxes and assessments	2,016	2,000	2,000
Subtotal	1,584,473	1,598,355	1,823,300
Deduct charges for quarters and subsistence	4,200	8,000	8,000
Total direct obligations	1,580,273	1,590,355	1,815,300
Obligations Payable Out of Reimbursements From Other Accounts			
07 Other contractual services	320		
Total obligations	1,580,593	1,590,355	1,815,300

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$181,302	$195,120	$164,375
Obligations incurred during the year	1,562,593	1,573,055	1,815,300
	1,743,895	1,768,175	1,979,675
Deduct:			
Reimbursable obligations	414	300	300
Unliquidated obligations, end of year	195,120	164,375	188,375
Adjustment in obligations of prior years	2,267		
Obligated balance carried to certified claims account	71		
Total expenditures	1,546,023	1,603,500	1,791,000
Expenditures are distributed as follows:			
Out of current authorizations	1,370,763	1,412,500	1,630,000
Out of prior authorizations	175,260	191,000	161,000

Mr. ANDERSEN. The committee will come to order, gentlemen. Dr. Reed, we are glad to have you and your associates with us again. Before you give us your general statement, we will insert pages 190, 191, and 199 through 204 of the justifications.

(The pages referred to follow:)

Purpose Statement

The Bureau of Dairy Industry was established July 1, 1924, pursuant to the act of May 29, 1924. Its activities comprise 4 broad areas of research, as described below.

1. Breeding, feeding, and management of dairy cattle and the inter-relationship of conformation, internal anatomy, and mammary development to producing capacity.

2. Determination of the effect of nutrition on growth, health, reproduction, and lactation, and the physiological processes affecting the usefulness of dairy cattle, including the vitamin requirements of calves, methods of evaluating forages, effects of renovation and rotations on pasture production, and the usefulness of grass silage in the ration of growing heifers.

3. Compilation and analysis of genealogical and production data on approximately 1,200,000 cows in 40,000 dairy herd improvement association herds to evaluate the genetic makeup of individual animals, particularly sires, in order that the hereditary influence of sires possessing an inheritance for high producing capacity may be disseminated to the general dairy-cow population.

4. Determination of the physical and chemical properties of milk and milk products and the effect of variations in handling and processing procedures; the species of microorganisms in milk and their characteristics, action and control in dairy-products manufacture; and the development of new and improved methods of manufacture and use of milk products and byproducts.

The Bureau also administers the Process Butter Act. Regulations are enforced involving the continuous inspection of the manufacture of process butter.

The Bureau conducts research in Washington, at 6 field stations, and at 15 State Agricultural Experiment Stations. The staff employed on November 30, 1952, numbered 260 of whom 139 were stationed in the field.

Appropriated funds:	
Appropriated, 1953	$1,590,055
Budget estimate, 1954	1,815,000

Salaries and expenses

Appropriation Act, 1953	$1,573,000
Reduction pursuant to section 411	−245
Activities transferred in the 1954 estimates from "Salaries and expenses, Office of Administrator, Agricultural Research Administration" for services at the Agricultural Research Center	+17,300
Base for 1954	1,590,055
Budget Estimate, 1954	1,815,000
Increase	+224,945

Summary of increases

To expand milk production by developing better dairy cattle	+124,945
To increase utilization of dairy products including presently unused byproducts	+100,000

Project statement

Project	1952	1953 (estimated)	Increase	1954 (estimated)
1. Dairy cattle breeding, feeding, and management	$571,106	$566,400		$566,400
2. Nutrition and physiology	379,615	376,600		376,600
3. Dairy herd improvement	291,309	296,355	+$124,945	421,300
4. Dairy products research	315,154	326,700	+100,000	426,700
5. Administration of the Process Butter Act	22,995	24,000		24,000
Unobligated balance	7,821			
Total available or estimate	1,588,000	1,590,055	+224,945	1,815,000
Transfer in 1954 estimates from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	−18,000	−17,300		
Reduction pursuant to section 411		+245		
Total appropriation or estimate	1,570,000	1,573,000		

STATUS OF PROGRAM

Current activities.—The Bureau conducts specialized research pertaining to dairy cattle, milk, and milk products. It cooperates with State and other Federal agencies, and with individuals, processors, and organizations in the dairy industry. Major phases of the research program include:

1. Research in dairy cattle genetics, including investigations to determine the relative usefulness of various systems of breeding in improving milking, reproductive, and disease-resistant qualities; feeding and management studies; anatomical studies to determine relationships between physical characteristics and milking ability; growth and development studies based on body weight and skeletal measurements; and methods of selecting profitable producers at an early age. Physiological reactions of dairy animals to extreme temperatures are also being determined to aid in improving dairy cattle in the South by breeding.

2. Research in dairy cattle nutrition and physiology to develop fundamental and practical information resulting in more economical dairy practices on the farm. The research includes studies on the causes of reproductive disorders in dairy cattle, methods of preservation of grassland crops, methods of evaluation of grassland crops as feed for dairy cattle, utilization of pastures, nutritional value of milk, and its products and studies on the basic nutritional requirements of dairy cattle.

3. Research in the basic principles of sanitary milk production and handling to preserve the palatability and nutritive and sanitary qualities of milk and to improve the quality and reduce the cost of manufacture of dairy products; to develop the domestic manufacture of dairy products; and to increase the utilization of milk products and byproducts in foods.

The Bureau also demonstrates at regional dairy experiment stations the dairy practices applicable to such regions and conducts a national dairy herd improvement program in cooperation with the State extension services to improve the producing efficiency of dairy cows by applying the results of research in dairy cattle breeding, feeding, and management. The average production of the 1,200,000 cows in 2,100 Dairy Herd Imrovement Association herds is approximately double the average production of all cows in the national dairy herd.

The Bureau enforces regulations relating to the manufacture of process or renovated butter. The purposes of this inspection are (1) to make certain that the finished product is fit for human consumption and (2) to make sure that the packages used correctly inform the public as to the nature of the product.

Among the projects now being conducted, the following are selected as typical:

1. Evaluation of outbreeding, inbreeding of various intensities, proved sire breeding, and crossbreeding in improving the milk producing qualities of dairy cattle.

2. Determinations of the reactions of dairy animals to heat stress and causes of severe declines in milk production.

3. Studies on basic and fundamental causes of reproductive disorders in dairy cattle.

4. Studies on the preservation, utilization, and evaluation of grassland crops for dairy cattle.

5. Evaluation of milk and its products for B_{12} activity.

6. The cause and control of mastitis in the Beltsville herd.

7. To determine the cause for and to develop means of preventing the development of the common defects in body, color, and flavor in stored condensed and evaporated milks.

8. Development of methods of processing and determination of the conditions of handling and storing normal and concentrated milks in liquid or frozen condition.

9. Development of methods for the manufacture of foreign-type cheeses, i. e., Swiss, Roquefort, brick, and Italian types, especially from pasteurized milk.

10. Development of new forms of and new uses for milk byproducts in bakery products.

Selected examples of recent progress

1. *Respiratory apparatus for cows developed.*—In connection with the development of cattle suited to the hot and humid sections of the South, a suitable respiratory apparatus has been developed which will accurately indicate the volume and rate of respiration for use in measuring heat tolerance in cows.

2. *Irrigation increases milk production.*—Milk production per acre was increased from 8,000 pounds to 12,000 pounds by the application of supplemental irrigation to pasture land at the Lewisburg, Tenn., field station.

3. *Milk production and reproduction superior during fifth, sixth, and seventh lactations.*—A study of milk production and reproductive efficiency in the University of Connecticut herd showed that both milk production and reproductive efficiency during the fifth, sixth, and seventh lactations were superior to that of earlier lactations, thus indicating that selections for both milk production and reproductive efficiency can be effective in a positive and similar direction.

4. *Indicator of bull fertility found.*—Preliminary analyses indicate that the rate of sugar usage in bull semen is an indicator of fertility. Further studies of this relationship are under way to substantiate these findings.

5. *Antibiotics ineffective in improving fertility.*—Treatment of repeat breeder cows with antibiotics was shown not to improve fertility when these were compared with similar untreated repeat breeders.

6. *Guide to nutrient evaluation of forages developed.*—A relationship between the digestible nutrients in feeds and their energy value has been established which will aid very materially in the proper evaluation of forages fed to dairy cattle.

7. *Sole ration of dehydrated alfalfa found acceptable.*—Dehydrated alfalfa as the sole ration for dairy heifers was found not to adversely affect reproduction as had been previously reported elsewhere.

8. *Techniques for study of utilization of fibrous feed developed.*—Improved techniques for the study of physiological characterists of the rumen microflora that are instrumental in utilizing fibrous feeds have been developed.

9. *Popular forage preservant found of no value on wilted ensiled forage.*—Sulphur dioxide has been used in some sections of the country to preserve the nutrients in nonwilted forage. Research now indicates that this treatment is of no value in the preservation of nutrients in ensiled wilted forage.

10. *Evidence uncovered of unidentified vitamins.*—Real evidence has been obtained which suggests the existence of still unidentified vitamin factors in certain feeds which affect the rate of growth of animals.

11. *Riboflavin found to promote usage of vitamin B_{12}.*—In research on the nutritional value of milk, riboflavin was shown to promote the synthesis of vitamin B_{12} in the digestive tract of the rat. Such information indicates that,with sufficient riboflavin in the diet, and with proper intestinal bacteria present, the dietary requirements for vitamin B_{12} may be lower than would otherwise be required.

12. *Cobalt discounted as agent to enhance vitamin B_{12} content of milk.*—The addition of cobalt to the ration of dairy cows was shown not to enhance the vitamin B_{12} content of the milk, as has been indicated by other investigators in the past.

13. *Methods for extracting hormones developed.*—Methods have been developed for the extraction and separation of estrone, estradiol, and estriol, hormones involved in reproduction and lactation, from solutions containing a mixture of very small quantities of these commonly occurring estrogens. The application of these techniques for the estimation of estrogens in blood and other biological fluids is being studied to determine their relationship to the sterility of dairy cattle.

14. *DHIA butterfat production above the national average.*—At the close of the calendar year 1951, 1,166,297 cows in 40,105 herds were on test in dairy herd improvement associations. The current average butterfat production of DHIA cows is 370 pounds compared to 211 pounds for all cows of the Nation.

15. *Sire proving promotes increased average production.*—In calendar year 1951, 2,414 sires were proved in dairy herd improvement associations. Their daughters produced an average of 10,179 pounds of milk and 417 pounds of butterfat as compared to 9,856 and 405 pounds of milk and butterfat, respectively, in 1950. Nearly one-third of the sires proved during 1951 had daughters whose average butterfat production exceeded 450 pounds.

16. *Sires in artificial breeding associations produce high-yield daughters.*—During 1951, 2,324 sires were used in artificial breeding associations, of which 39.1 percent or 909 had 5 or more daughters with DHIA production records. These daughters produced an average of 446 pounds of butterfat.

17. *New method developed for producing vitamin B_{12}.*—A method has been developed for producing vitamin B_{12} in relatively large amounts from whey or skim milk by using the bacteria employed in making swiss cheese A public service patent on this process has been applied for since it may be commercially practical to manufacture this important vitamin from these surplus byproducts

18. *Objectionable frozen milk flavors lessened.*—Undesirable flavors that develop during the storage of frozen fluid and concentrated milks were found to lessen at storage temperatures below $-10°$ F.

19. *Milk spoilage agent uncovered.*—The presence of iron was found to greatly stimulate the formation of bacterial spores in milk. This points toward the cause of spoilage in condensed milks.

20. *Swiss cheese manufacture improved.*—Research shows that high acidity in swiss cheese curd during the first 24 hours of making hinders the growth of the bacteria which produce the desirable characteristic flavor during the ripening of this cheese.

21. *Use of goat's milk improves flavor of Italian-type cheese.*—It has been found that the characteristic flavor of Italian-type cheese depends largely on breakdown of fat. Fat-splitting enzymes from goat sources were found to produce a more desirable flavor in Provolone and Romano cheeses than do enzymes from calf or sheep sources.

22. *Simplified fat test developed.*—A simplified, accurate fat test in which a detergent is used in place of sulfuric acid has been developed to the point where it will soon be ready for trial in the dairy industry. This test may eventually replace the present Babcock test for fat.

Receipts from sales of dairy products and animals (deposited in miscellaneous receipts of the Treasury)

Fiscal year:	Receipts
1948	$149,082
1949	128,328
1950	109,862
1951	149,730
1952	134,337

Statement of obligations under allotments and other funds

[Includes only those amounts which, by November 30, 1952, were actually received or programmed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases]

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, Agriculture, (Bureau of Dairy Industry): Marketing research	$18,395	$19,000	$29,000
Obligations under reimbursements from governmental and other sources: Salaries and expenses	414	300	300
Total obligations under allotment and other funds	18,809	19,300	29,300

Mr. ANDERSEN. Now, sir, we will be glad to have a statement from you.

GENERAL STATEMENT

Dr. REED. Thank you, Mr. Chairman. Really, it is a privilege for me to come before this committee again. Briefly, I want to review the accomplishments of the Bureau of Dairy Industry and also to describe our needs for conducting a more adequate program of research on behalf of the dairy industry of the United States.

I am fully aware of the great demands for funds to conduct many other programs of benefit to the public welfare and the need for making the appropriated dollar go as far as possible. In our organization we have endeavored, and I believe with considerable success, to expend our funds wisely. We have developed a program of research in our various divisions of work, in which we are emphasizing lines of research that promise the greatest immediate benefits to the dairy industry.

I am sure you know, however, that the increased cost of almost everything that goes into our research program has made it most difficult to maintain the kind and size of program that I believe the dairy industry needs at this time.

ANNUAL MILK PRODUCTION PER COW MUST BE INCREASED

I pointed out to you last year that the per capita production of milk has been going down steadily during the past few years. It decreased from 749 pounds per capita in 1951 to 732 in 1952. For example, in January 1953, the per capita production was 1.77 pounds per day, the fifth lowest on record for the month of January, which figures have just been made available. Numbers of milk cows and dairy farmers are decreasing, and the end does not yet appear to be in sight. This means that the downward trend in the per capita production of milk may continue. However, if our people are going to continue to enjoy the benefits of liberal supplies of invaluable dairy foods, the total milk supply must be increased and the supply must be used more efficiently.

This, I might add, is particularly true when we realize how fast our population is increasing. I understand now the latest figures show that there are 7 births every minute and the net increase of our population is at the rate of 5 persons per minute.

Our total milk supply can be increased by stepping up the annual output of milk per cow. This can, and probably will, be done to the extent that new information is developed and put to use. More information is needed on how to develop cows that will have the hereditary ability to produce larger amounts of milk, and on how to feed and manage such cows so that they can produce up to their inherited abilities. This will result in more milk at a greater profit to the producer and, at the same time, benefit the consumer. Examples of a few of our recent accomplishments in this field of research are given in the section on "Status of program" which you, Mr. Chairman, have just included in the record.

GREATER HUMAN UTILIZATION OF NONFAT MILK SOLIDS

Certain segments of the dairy products industry are in distress. At the present time, practically all of the milkfat we produce is used as food. However, the demand for butter is falling and the substitution of other fats for butterfat in dairy products, such as ice cream, is increasing. We cannot predict how far this will go. Only about two-thirds of the nonfat solids in the national milk supply is consumed directly as human food. The nonfat portion of milk contains the protein, sugar, minerals, and the water-soluble vitamins that are so essential in the human diet. This valuable food material should be channeled directly into food uses. When this is done, some of the price burden can be taken off milkfat and shifted onto that valuable part of the milk that is under the cream line. As you know, milk is bought on the basis of the amount of milkfat it contains, with little or no consideration given to the nonfat solids.

I believe that the nonfat solids should carry more of the cost than they do at present. But before this can be done the nonfat milk solids must be put to better use for human food. This can be accomplished only when we develop, through research, easier and better ways of presenting them in foods to the public. We have made some progress in this direction, but much more needs to be done.

INCREASED FUNDS NEEDED FOR TWO LINES OF RESEARCH

This year I am asking the Congress for increases to strengthen two lines of our work. In doing this, I recognize that each of our four research divisions is hard pressed for funds and that their programs are worthy of increases. It appeared to me, however, that strengthening the DHIA sire-proving program and intensifying the dairy-products research are of the greatest importance at this time. Therefore, I am asking that you favorably consider our request for an increase of $124,945 for dairy-herd-improvement investigations and an increase of $100,000 for research on the technology of milk, milk products, and milk byproducts.

FARMERS' CONTRIBUTION TO DHIA PROGRAM

You are familiar with both the DHIA program and the national dairy-sire-proving program, which are carried on cooperatively by the State agricultural colleges and the Bureau. These programs have grown rapidly in recent years because dairy farmers find them very valuable. Some 40,000 farmer members of local dairy-herd-improvement associations spend over $5 million yearly to have their cows tested.

The information produced in this testing program has become very useful in locating and identifying bulls whose daughters have produced more milk and butterfat than the dams of the daughters. This has led to more efficient milk production. The development of the sire-proving program has become a means of utilizing the production records of daughters and dams for proving the sires. The job of compiling the proved-sire records is the Bureau's part of the Federal-State cooperative program. The Bureau is the logical site for this activity. It offers a means for the development of a coordinated program. Further, it offers the economies of a centralized operation.

INCREASED DEMAND FOR PROVED-SIRE INFORMATION

The demand for information on proved sires is increasing with the development and rapid growth of artificial breeding. Artificial breeding associations want to fill their studs with as many proved bulls as possible to serve their membership. There are more than 56 of these artificial-insemination associations breeding something over 4 million cows. They believe that spreading the services of proved sires over a large cow population is the best practical way to improve our dairy cattle. It is apparent, therefore, that both the DHIA program and the sire-proving program are highly important steps in improving the Nation's dairy cattle.

BUREAU UNABLE TO KEEP SIRE PROVING ON A CURRENT BASIS

The data supplied to the Bureau by the State agencies and the demand for information on sire provings have grown so fast that it has been impossible for the Bureau to keep up with it. I pointed this out last year when I was before this committee, and it is even more true this year. We are very much concerned about our ability to service this important activity properly; and, judging from correspondence coming to my attention, I am sure that interested groups

and individuals within the dairy industry also are greatly concerned about it.

INDEPENDENT GROUP STUDIES WAYS TO MEET WORKLOAD

When we asked for an increase for this activity last year, which we did not get, the committee suggested that we study the possibilities of meeting the increased workload, which has been imposed on the Bureau by the steady growth of both the DHIA program and the sire-proving program, by increasing the mechanization of our operations. I indicated at the time that we were using as much modern machine equipment as we could.

However, the committee's suggestion was followed. A thorough study of the Bureau's DHIA operations was made by an independent group, and the results were presented to us in the form of a report. With your permission, I should like to insert a summary of this report in the records as part of my testimony.

Mr. ANDERSEN. That will be satisfactory. The report can go in the record at this point.

(The report referred to is as follows:)

REPORT OF STUDY ON MECHANIZATION IN THE DAIRY HERD IMPROVEMENT INVESTIGATIONS DIVISION

INTRODUCTION

The budget for the fiscal year 1953 included an increase of $50,000 to enable the Bureau of Dairy Industry to place the dairy-herd-improvement investigations workload on a current basis. In its report on the Department of Agriculture appropriation bill, 1953 (Rept. No. 1673), the House Committee on Appropriations stated as follows, regarding this estimate:

"The amount recommended for 1953, $1,573,000, is a continuation of the 1952 program and is a reduction of $48,000 in the 1953 estimates. The 1953 estimate included an increase of $50,000 to place the dairy-herd-improvement workload on a current basis. The committee believes that study should be given to meeting the increase through further mechanization of the handling of these records."

In response to this suggestion, a study of this entire activity was conducted. The International Business Machines Corp. was asked to make a study of the machines presently on hand and the current machine procedures in the Division. A management analyst from another bureau was selected to study all other phases of the Division's work and to coordinate the work done by the IBM technicians. He was selected because he had no previous association with the work and could therefore be completely objective in his findings. Those responsible for the IBM portion of the study were C. R. Thompson, Robert W. Sutton, Helen Berling, and Mae Smith, representatives of that corporation.

The results of the survey were gained through interviews with operating personnel of the Dairy Herd Improvement Investigations Division, observations of the various work processes, and through interviews with other key members of the Bureau of Dairy Industry.

Action was also taken by the analyst to become familiar with the history and background of the dairy-herd-improvement program and the general operating methods of the local Dairy Herd Improvement Association. This orientation included a visit to a nearby DHIA supervisor.

STUDY OF MACHINE OPERATIONS

The entire machine-operation phase of the work was studied in detail by the representatives of the International Business Machines Corp. In their study they considered the machines currently on hand with relation to the present workload and they also scrutinized the machine procedures to make certain that the latest methods were being used. The results of this study are attached. It will be noticed from the IBM report that the machines now on hand "are of the proper type and in sufficient quantity to meet the present workload requirements."

Every effort has been made in the past to obtain newer types of machines as they have become available and to determine if other phases of the work could be advantageously mechanized. Also, in considering the expansion of the workload, the IBM representatives have suggested the procurement of a machine with greater capacity for listing. In answer to the specific recommendations obtained in the IBM report, the Bureau has taken the following action:

MACHINE RECOMMENDATIONS

Recommendation No. 1.—"Replace present type 405 accounting machines with a type 402 accounting machine at an additional cost of $80 per month. This will enable the Machine Section to produce reports faster and also allow for expansion of number of sire provings."

At the present time, and until such time as the number of sire proofs increase, the Bureau does not feel that it is wise to obtain this new machine. However, as funds become available to reduce the backlog of work in this Division, thereby accelerating the rate of sire proving, the use of the type 402 machine will be considered in light of the need.

Recommendation No. 2.—"Redesign of sire proof list on a printed form. This will decrease the time required to prepare and make an easier record to review in the Proof Sire Records Section."

Action has been taken to redesign this form and a supply has been ordered.

Recommendation No. 3.—"Compare birth dates of all new 718's when they are filed in holding file."

This recommendation will be tested and, if found practicable, will be made part of the procedure of the Division.

Recommendation No. 4.—"Changes in procedure in sire proving:

"(*a*) Arrange daughter detail cards in dam's number sequence to expedite hand pulling of dam's record cards from cow file.

"(*b*) Calculate on type 604 electronic calculating punch to determine that the dam is 15 months older than the daughter.

"(*c*) Calculate on type 604 electronic calculating punch to determine that the sire is 18 months older than the daughter.

"(*d*) Recalculate on type 604 electronic calculating punch all cards for M. E. milk and fat.

"(*e*) Calculate on type 604 electronic calculating punch to determine that all records used are for at least 180 days and not more than 305 days."

Items (*a*), (*b*), (*c*), and (*e*) will be tested and, if found practicable, will be made part of the procedure of the Division. Item (*d*) has been put into effect.

OPERATIONAL RECOMMENDATIONS

Generally, the study of the nonmechanical phases of the work of this Division pointed up the need for planning the work in greater detail, for balancing the work in its various stages, and for the development of more detailed performance standards and reports as they relate to the output of individual employees, the various units and sections, and the Division as a whole. Action is being taken to test the recommendations made. Those found practicable will be adopted.

INTERNATIONAL BUSINESS MACHINES CORP.,
Washington 6, D. C., December 16, 1952.

Dr. O. E. REED,
Chief, Bureau of Dairy Industry, Agricultural Research Administration,
United States Department of Agriculture, Washington 25, D. C.

DEAR SIR: Reference is made to your request for an up-to-date evaluation of the operations of the Dairy Herd Improvement Division to determine if the most modern IBM equipment is being used and that the procedures and techniques are completely mechanized and compatible with the requirements of producing the most accurate, economical, and efficient reports.

Our study and recommendations are based on an analysis and review of the work being done in the following sections:

1. Machine tabulations
2. Proof sire records
3. Proof sire and herd analysis
4. Records appraisal
5. Record file

In October 1949, IBM made a survey of your Division and recommended the replacement of the type 601 multiplier with a later model 602A calculating machine and the addition of several types of machines that assisted greatly in reducing the time required to process sire-proving records. Since 1950, the type 602A calculating machine has been replaced with the type 604 electronic calculator; the key punches, verifiers, and sorters have all been replaced with the latest type of IBM machines.

The study that has just been completed indicates that the machines installed in the Machine Tabulations Section are of the proper type and in sufficient quantity to meet the present workload requirements. It is recommended that the type 405 accounting machine be replaced with a later model type 402 accounting machine. This later model is a faster listing machine and would enable the section to produce reports faster and triple the number of sire-proving records processed. The additional cost for the replacement of this machine would be $80 a month.

The study of the Proof Sire Records, Proof Sire and Herd Analysis, Records Appraisal and Records File Sections indicated that there is a tremendous amount of detail checking of dates and comparison of individual records to complete a sire-proving report. The reason for discrepancies is due mainly to the fact that the original records submitted by the Dairy Herd Improvement Associations are reported by a number of different owners and over a span of 5 to 10 years. To assist in locating these errors we are suggesting a number of changes in the procedure that we feel will reduce the amount of clerical time required to prove a sire record. These changes are outlined in the attached chart. Although these changes require additional work in the machine room, it is felt that the extra machine time is very small and can be readily absorbed by the present type 604 electronic calculator.

IBM welcomes this opportunity to review your operations periodically in order that we may be able to offer you the advantages of our latest equipment and techniques. Please feel free at any time to call on us for assistance in project planning, flow-chart design, procedure analysis, or any other activities concerned with increased simplification and economy.

Yours very truly,

R. W. SUTTON.

SUMMARY OF RECOMMENDATIONS

1. Replace present type 405 accounting machines with a type 402 accounting machine at an additional cost of $80 per month. This will enable the Machine Section to produce reports faster and also allow for expansion of number of sire provings.

2. Redesign of sire-proof list on a printed form. This will decrease the time required to prepare and make an easier record to review in the Proof Sire Records Section.

3. Compare birth dates of all new 718's when they are filed in holding file.

4. Changes in procedure in sire proving:

(*a*) Arrange daughter detail cards in dam's number sequence to expedite hand pulling of dam's record cards from cow file.

(*b*) Calculate on type 604 electronic calculating punch to determine that the dam is 15 months older than the daughter.

(*c*) Calculate on type 604 electronic calculating punch to determine that the sire is 18 months older than the daughter.

(*d*) Recalculate on type 604 electronic calculating punch all cards for M. E. milk and fat.

(*e*) Calculate on type 604 electronic calculating punch to determine that all records used are for at least 180 days and not more than 305 days.

Dr. REED. The important finding of the investigators was that the use of mechanized equipment is being employed to the maximum extent possible in relation to the personnel available. In fact, the capacity for work of the present machine setup exceeds that of the nonmachine phases of the workload. Certain improvements in procedures were suggested, and I assure you that they are being tested and put into use where they are found practicable. To put the sire-proving program on an effective current basis the important need is still an increase in personnel.

SOME RESULTS OF DAIRY-PRODUCTS RESEARCH

INCREASED UTILIZATION OF NONFAT MILK SOLIDS

It would seem to me that both the dairy farmer and the consumer would benefit if ways were found to utilize, directly as human food, more of the large amounts of nonfat milk solids that are produced. To find ways to do this requires a great deal of technological research in order to develop information on how to handle the nonfat materials and put them into forms that are acceptable to humans. I have previously told this committee how our scientists have developed cheese spreads from cheese whey, sherbets from cheese whey, and ice cream from buttermilk.

ACCELERATING CHEESE PRODUCTION

More recently our technologists have developed a new method, for which a patent is now being applied, for making uniformly high quality cheddar cheese. This method reduces the time for making a batch of cheese by more than half. In other words, by using this new method, which will be covered by a public-service patent, a cheesemaker could make more than twice as much cheese, in a given time and with a given set of equipment, as he could by using present methods. We believe this new method will bring great benefit to the cheese industry when adopted, particularly in the area of saving labor. The quality of the cheese is excellent.

SIMPLIFIED MEASUREMENT OF BUTTERFAT CONTENT OF MILK

During the past year our scientists also have perfected a new method of determining the butterfat content of milk and milk products. This method has a number of advantages over the time-honored Babcock method now in general use. This is the first change made since 1892 when the Babcock test was brought in. In the new method, a detergent solution replaces sulfuric acid, a material that is difficult and hazardous to use and one that often is in short supply under national emergency conditions. The new method is easy to use and is more accurate on all dairy products than the Babcock method.

FIELDS REQUIRING RESEARCH

METHOD FOR MEASURING NONFAT SOLIDS OF MILK

More recently, we have set up a project to determine the possibility of developing a simple method for measuring the amount of nonfat solids in milk.

This is one of the important problems we are working on at the present time. Before we can develop a method of paying for milk on the fat-nonfat solids basis, we must have a better test for the solids in milk.

CHEMICAL COMPOSITION OF MILK

In dairy-products research, we need to do considerable research on the complex chemical composition of milk and milk products in order to understand what influence heating and related treatments have on the stability, composition, quality, palatability, and nutritional value of dairy products.

IMPROVED EVAPORATED MILK

If our scientists can learn how to process milk so that an evaporated product, when rediluted for use, would have the same appeal and acceptance as fresh fluid milk, a great step forward would be made toward solving some of the problems in marketing milk and dairy products. Likewise, methods of making dry milks that will maintain their quality in storage and that have the characteristics of fresh milks when reconstituted are needed to extend the usefulness of these important milk products.

ENCOURAGE INCREASED USE OF MILK SOLIDS

Technological studies to develop the usefulness of milk solids contained in skim milk, whey, and buttermilk in bread and sweet bakery goods will add to these foods milk nutrients which will enhance their quality and nutritional value.

The Dairy Products Research Division of the Bureau is the principal agency which furnishes general and specific information on all phases of dairy-products handling, manufacture, and use to the farmers, consumers, and those actively engaged in handling and processing.

RESEARCH PERSONNEL

At the present time the scientific personnel of the Division engaged in research totals 31, a reduction of 26 since 1938. This force is wholly inadequate to conduct work on all the problems vital to the large sections of the industry. For example, at the present time no work is being done on butter and ice cream, and comparatively little work is being done on concentrated milks. Most of our projects are conducted by one employee per project. I would like to enlarge on that. Our funds have been reduced through statutory payroll increases, and so forth, to the point where the personnel has been reduced in number by 26 since 1938. What has happened is that we still have many of the top scientists with the know-how but we must have additional employees so as to make maximum use of all of the present experienced staff. At a slightly increased cost, most of our projects could be conducted by more than one employee per project. The increase in funds requested would provide for the employment of 16 scientists at an average grade GS–7, 2 scientific aides, 1 stenographer, and 1 clerk.

EMPHASIS OF RESEARCH

In view of the situation in the industry, little work would be devoted to butter and ice cream. The work on concentrated milks and cheese would be greatly strengthened, since we believe these are forms in which most of the solids of milk can be conserved and consumed, provided their quality has been enhanced. Greater emphasis would also be placed on the utilization of byproducts as food. Greater use of these products and the byproducts would make it possible to reduce the price of milkfat and increase the consumption of market milk.

OTHER RESEARCH MUST BE MAINTAINED

These and other similar problems need study and solution if the dairy industry is to continue to prosper and make its maximum contribution to the nutritional welfare of the people. These problems are so important at this time that I feel justified in asking for increases to support study on them by the Federal Government.

While I am not asking for increases on other major lines of work of the Bureau, they are no less important. It is very difficult to maintain our breeding and nutrition investigations at an effective level under conditions of steadily increasing costs. Yet, they are important to the development of an efficient dairy industry in this Nation.

During the year, we have been reviewing and consolidating a number of our work projects. As a result, some have been eliminated, and a few expanded. A number of line projects have been discontinued or revised.

PUBLICATION OF RESEARCH RESULTS

Results of our research, and also suggestions or recommendations based on our research, are published in technical bulletins and other printed publications issued by the Department of Agriculture, and also in technical and trade journals outside the Department. The total number of BDI bulletins issued by the Department and articles submitted for publication in outside journals was 59 in fiscal year 1952, compared to 87 in 1951.

In addition, we issue progress reports on our research and also practical suggestions based on our research in our processed BDI information series. The number of processed reports issued was 16 in 1952 and 29 in 1951. The number of copies of the various reports distributed on request ranged from 200 in some cases to 30,000 in other cases, depending on the nature of the information.

Our processed information also includes the monthly Dairy Herd Improvement Association letter, which gives association members and other dairymen our latest information about sires proved in DHIA herds. About 7,500 copies of the monthly letter are issued each month and mailed on request to DHIA members, and to DHIA supervisors and other leaders in the DHIA program.

Mr. ANDERSEN. Dr. Reed, we appreciate your statement.

OUTMODED EMPHASIS ON BUTTERFAT CONTENT

We are faced today, as you know, with a problem affecting many people interested in the prosperity of agriculture. That is the problem of what to do with the millions of pounds of good butter for which at present prices there seems to be little market. Do you have any comments upon that particular situation for the record?

Dr. REED. The principal comment that I would have to that, Mr. Chairman, is that we believe that this time-honored custom of basing all of our dairy products, pricewise, on butterfat is outmoded.

DESTINCTION BETWEEN BUTTER AND BUTTERFAT

Mr. WHITTEN. Of course, you and Mr. Andersen are experts in this dairy field. You work at it all the time, though I do not know whether you work any harder at it than the chairman of this com-

mittee has in looking after the dairy interests through the years. But now when you mention butterfat, that is an entirely different thing from butter. For the record, will you just explain that? I think it would be well to have it in the record.

Dr. REED. Butter contains 80 percent butterfat, while butterfat or butter oil is almost wholly milk fat.

Mr. WHITTEN. But the milk itself, the quality and the grade is determined also by its butterfat content.

Dr. REED. That is right.

Mr. WHITTEN. Which is a different thing from butter. I wanted the record to make that distinction.

Dr. REED. Practically all of the purchases of whole milk in this country are made on the basis of the butterfat content with little consideration being given to nonfat milk solids.

Mr. ANDERSEN. You contend, Doctor, that that system is outmoded?

Dr. Reed. The system of using butterfat as an entire basis I think is wrong. I think that the solids-not-fat, which are really the most important nutritionally, should bear more of this cost.

SOLUTION FOR ALLEVIATING BUTTER SURPLUS

Mr. ANDERSEN. Have you any specific suggestions to make, Doctor, as to what we could do to alleviate this present butter situation?

Dr. REED. The only hope that I can see from the standpoint of research right now is to utilize more of the solids-not-fat in foods that the people will consume. As a matter of fact, we are consuming now in household use over 100 million pounds of dry skim milk or milk solids-not-fat as it is called. About 30 percent of the total milk solids production is not used as or in foods. It is either wasted—I am talking about the solids in skim milk, buttermilk, and whey—or fed to pigs or chickens, or used for some commercial purposes. It is good animal food but should be used as human food.

Personally, I think that we ought to continue work on the program stated. The idea back of much of our products research in the Bureau is to make greater use of these solids-not-fat in the milk. As this can be done, more of the cost of milk can be carried by nonfat solids, thus taking some of the price off of butterfat. If we can do this, butter could be sold at a lower price.

Mr. ANDERSEN. But then following that up, suppose farmers cannot produce that butter at a cheaper price than what they obtain for it under what is known as parity? Then what?

Dr. REED. Well, of course, some of your farmers, and some of the farmers I know of in the Middle West, do not have an opportunity to sell their whole milk as such.

Mr. ANDERSEN. That is correct.

Dr. REED. They sell only the fat or cream.

Mr. ANDERSEN. That is correct.

Dr. REED. This is the fellow who is the hardest pressed as I can see right now.

FLUID MILK DISTRIBUTION PROBLEMS

Mr. ANDERSEN. My particular area is 200 miles from any large whole milk consuming area. The cost of getting that whole milk to

any point of consumption is prohibitive even if you were to disregard limitations due to milk agreements in milk sheds. Now, does that mean that we in southwestern Minnesota, eastern Dakotas, and all of that vast region are to withdraw from the dairy industry? Is that what we are up against today?

Dr. REED. No. I do not have any figures on the cost of transporting milk long distances, Mr. Chairman, to present here. Perhaps the Bureau of Agricultural Economics has some figures. But I do know that milk is now being transported hundreds of miles and it must be done effectively and it must pay or people wouldn't do it.

Mr. ANDERSEN. I believe, Doctor, it is transported into such areas as Chicago and St. Louis; but in order to get the whole milk from my region into the big consuming areas, you would have to take it 600 miles.

Mr. LAIRD. This is done now in periods of low production at distant markets. Fluid milk from Wisconsin is then sold at a premium.

Mr. WHITTEN. My district supplies about half of the whole milk in the Memphis, Tenn., milkshed; however, most of the time considerable quantities are supplied from Wisconsin, and Wisconsin trucks run through my State all the way down to Jackson, Miss., Birmingham, and several other places. That was true only a few years ago and I presume that condition continues.

Dr. HODGSON. They ran to Florida, too.

Dr. REED. I remember the first tank of milk was shipped largely as a demonstration, from Florida to the National Dairy Show held in Chicago. That was about 1915 or 1916. The war changed a lot of things. We have improved our methods, or machinery in handling milk. During the war there were thousands upon thousands of gallons of milk sent from Wisconsin and Minnesota and Indiana down to Florida and to Texas and into the camps all through the southern part of the country. I just want to make this one point although I do not have the figures on it. You mentioned the milk that comes to Memphis. Until a short time ago Memphis had the lowest retail price on milk of any city of its size in the country. Milk from Wisconsin and Minnesota was shipped to those areas and sold at that relatively low price.

Mr. WHITTEN. The producers in that area have some problems right now. But during the period that you refer to, even though Memphis had about the lowest retail sales price for milk, the consumer had a wonderful setup and the producer was prospering. They had the best distribution system in the city. The difference between what the producer got and what the consumer paid was the smallest margin that we had anywhere. For the moment, we are having some problems with milk production prices; the producer is being squeezed in the area right now due to a price war between the local distributors. I may be in error as to that but that is the information that has been passed on to me.

ENCOURAGEMENT OF WHOLE-MILK CONSUMPTION

Mr. ANDERSEN. Doctor, you state in your report that—

numbers of milk cows and dairy farmers are decreasing and the end does not yet appear to be in sight. This means that the downward trend in the per capita production of milk may continue. However, if our people are going to continue

to enjoy the benefits of liberal supplies of invaluable dairy foods, the total milk supply must be increased and the supply must be used more efficiently.

Are you utilizing any funds in your organization to study this problem of perhaps shifting over into whole milk much of the product which is now put into butter? Are you doing anything toward encouraging that shift in any way?

Now, you say, on the one hand we must produce more whole milk. All right. And, on the other hand we in southwestern Minnesota find it difficult to get the price we should for our butter to continue in business. We have to have that price supported. Now, what is the answer? Is there any way for my region to get the benefits of whole-milk consumption by people who need it all through the East? That is what I would like to know specifically. Is anything being done toward encouraging the movement of whole milk out of such areas of Minnesota instead of putting it through butter channels?

Dr. REED. No, Mr. Chairman; really that does not come in our bailiwick.

Mr. ANDERSEN. I know it doesn't.

DR. REED. Ours is a research bureau largely devoted to problems of milk production, milk processing, manufacture, and utilization. We have done relatively little on marketing research. This is pretty much a problem of economics and marketing and therefore, is largely outside of the activities of our Bureau. However, the work which we do on improving the quality of concentrated milks and dried milks through manufacturing procedures are directly related to this problem. When we have these products of sufficiently good quality and appeal, the public will take more of them and they can be produced in areas such as your district. This approach would appear to be a logical one for a good market outlet for at least part of our milk supply.

Mr. ANDERSEN. Let me disagree with you slightly. I think it does come within your bailiwick, because you represent the dairy industry of America. Your job in research is to do everything that you possibly can to help that industry, and you have always done so through the years. We want you to study into this and see if we can shift this butter production over into whole milk production and find a market for that whole milk, so as to prevent these farmers through that area giving up their dairy herds.

I think that is in your purview.

Mr. WHITTEN. I would like to agree with you and point out that what you have in mind there clearly comes within marketing and distribution which is in line with research problems. A man dealing with that particular commodity certainly is interested in the preservation, the handling, and the marketing—and that leads into distribution.

Mr. ANDERSEN. I want to encourage Dr. Reed here to get into that field.

Mr. WHITTEN. Certainly the marketing of milk is a proper subject for the attention of the Bureau.

COORDINATION OF DAIRY RESEARCH WORK

Mr. HORAN. Dr. Clarkson, at this point, how do you coordinate your dairy research work? One of the items that bothers us is—and we are making some headway on it—is the wise use of research and

marketing funds. There is no question but what we have unrest and a lot of dissatisfaction in our dairy industry at this time. We are consulting the Bureau of Human Nutrition and Home Economics on this. They have an item to determine the quantities of different foods and other foods and services consumed by families in various regional and economic groups, to evaluate the economy and nutritional adequacy of diets and to study the factors such as income, prices, family size, that affect family expenditures for living. We know that there is a trend away from butter and dairy products as pure products in the direction of spreads and butter substitutes. It is an economic fact that has been fought out on the floor of the Congress, and it is well known.

We also have the Bureau of Agricultural Economics that conducted at least related research. I just wonder what is going on now to attempt to meet the problems of the dairy industry in a changing world. Obviously, something has been done because, as I mentioned a minute ago, Secretary Benson when he was before us raised the point that one of the problems in the dairy industry was the trend away from butter to spreads. Obviously, the dairy industry is interested in this, and it would seem to me, though, that if we are going to get the most out of our taxpayer's dollar, we ought to have a closer relationship between at least three bureaus, and the place where the cooperation should be, it seems to me, would be through your Office.

Dr. CLARKSON. Certainly, Secretary Benson has placed the responsibility on the industry and upon the Department to work out a solution for this problem. The Dairy Research Advisory Committee that met with us about a month ago emphasized very strongly these aspects of marketing, distribution, and also this research that Mr. Reed's bureau carries on to find new and better uses and more acceptable uses for the products other than butterfat of the dairy industry.

Now, under the marketing law, the Marketing Act, we are looking very closely at this problem to see what can be done by way of changing our emphasis on funds already available to us, to see if we cannot be helpful in working out a solution to the marketing. But I point out that we need under that Marketing Act considerably more funds than have been available to us and we are going to have to rob Peter to pay Paul, so to speak, to put more emphasis on this particular problem.

SOLUTION TO DAIRY PROBLEMS URGENTLY NEEDED

Mr. HORAN. Of course, Dr. Clarkson, we run into the whole field of continuing research as against research that the economics of the moment or of the era would dictate should have accent and emphasis.

I do not think there is any question but what the dairy industry is one of our industries that really needs help now. It is one of our important industries. It is your job to terminate the ones that we do not need or where they can be held in abeyance and put the emphasis, put the butter or the grease where the wheel is squeaking; that is why I wonder just what has been going on. Now, you have met with the Dairy Advisory Committee a month ago.

Dr. CLARKSON. About a month ago.

Mr. HORAN. Is there a continuing intrabureau committee working on this?

Dr. CLARKSON. Yes, sir; we have a working group that follows up.

Mr. HORAN. Who are the members of that?

Dr. CLARKSON. Bureau of Dairy Industry, from PMA, from BAE, from all the agencies of the Department that have an interest in dairy problems.

Mr. HORAN. That would be BAI, too.

Dr. CLARKSON. Yes; also Farm Credit Administration, Home Economics, Agricultural and Industrial Chemistry, and all other agencies of the Department that are interested in dairy problems are represented.

Mr. HORAN. Would you supply for the record the names of the members of that entire bureau agency who are working on this?

Dr. CLARKSON. Yes, sir, because this is something of the moment. I know it has created a lot of trouble in the dairy States of the Midwest, particularly the Chicago milkshed and Twin Cities milkshed. One of the basic purposes of the Department of Agriculture is to help solve such problems, through the coordinated efforts of its specialized agencies.

(The information requested follows:)

DEPARTMENT DAIRY WORKING GROUP

H. C. Kriesel, BAE
Donald E. Hirsch, FCA
H. H. Stage, BEPQ
E. F. Phipard, BHNHE
H. C. McPhee, BAI
George W. Irving, Jr., BAIC
Wallace Ashby, BPISAE
Joseph A. Becker, OFAR
Max Hinds, Extension Service
R. E. Hodgson, BDI
L. F. Herrmann, PMA, Dairy Branch
D. L. Espe, OES
Kenneth McCallister, PMA, Marketing Facilities Research Branch
L. G. Foster, PMA, State Marketing Services

DAIRY ADVISORY COMMITTEE

Agnew, Arnie, Milton Junction, Wis.
Friend, L. F., secretary-manager, Mid-South Milk Producers Association, Towers Building, 1497 Union Avenue, Memphis 4, Tenn. (vice chairman)
Gaumnitz, E. W., executive secretary, National Cheese Institute, Inc., 110 North Franklin Street, Chicago 6, Ill.
Geyer, Ken E., general manager, Connecticut Milk Producers Association, 990 Wethersfield Ave, Hartford 6, Conn.
Haymes, P. L., United Milk Products Co., 2000 West 14th Street, Cleveland 13, Ohio
Howe, D. K., Fairmont Foods Co., Omaha 8, Nebr.
Palmer, Clarence B., president, Sanitary Milk Producers, 2208 Washington Avenue, St. Louis 3, Mo.
Sharp, Dr. Paul F., director, agricultural experiment station, University of California, Berkeley 4, Calif. (chairman)
Stitts, Dr. T. G., H. P. Hood & Sons, Inc., 500 Rutherford Avenue, Boston 29, Mass.
Turner, Eugene L., P. O. Box 1161, Anniston, Ala.
Waltz, Russell, president, Consolidated Dairy Products Co., 635 Elliot Avenue West, Seattle 99, Wash.
Henry W. Marston, executive secretary

Mr. ANDERSEN. The production of a sufficient quantity of good whole milk for the children of America is important; it is one of the basic necessities. We cannot afford to let anything interfere with that

production. That is my viewpoint, Dr. Clarkson and Dr. Reed, and as Mr. Horan has stated, the problem is of very serious import at this time. That is proven by the fact that we are trying to do something, to the extent of hundreds of millions of dollars if necessary, to prevent a further decline in the market and to keep these dairy farmers in production.

Dr. CLARKSON. It is a serious problem in regard to this industry, very much like it is in the meat industry, the emphasis on economic use of the products in the industry.

Mr. ANDERSEN. I would think that this problem is ahead of the other. Here you are dealing with a product that is important to the children of America, Dr. Clarkson. Milk in my opinion comes ahead of meat as a basic necessity. Whatever can be done through you, collaborating with the Bureau of Animal Industry, will I think meet with the approval of this subcommittee.

UTILIZATION OF MILK SOLIDS AS DAIRY PRICE SOLUTION

Dr. HOLM. What you said is absolutely true. It is worse than in other industries because in this industry we have learned to use only 72 percent of the solids that we produce. We are left with 28 percent of the solids that cannot be consumed. Now that is the reason that the price of fat is so high. When we can use this 28 percent of solids by finding uses in products which the consumer will accept and pay for, I think we will have the butterfat problem solved.

Mr. ANDERSEN. Thereby you could give the average producer in my area something for the residue material besides butterfat. Yes, I believe that is the solution.

Dr. HODGSON. Work on the production of cheese and particularly concentrated milk is important from an area of production such as you mention.

Mr. ANDERSEN. Just as an example, I used to figure when I fed skim milk to my hogs that the skim milk was worth about the same as the market price of hogs in dollars. For instance, if hogs are selling at 20 cents per pound today, it would indicate that my skim milk was worth 20 cents per hundred pounds. That is a ridiculous price for that good food that should go into other areas of consumption. There is the basic trouble.

Dr. HOLM. The 28 percent mentioned is mostly all solids, not fat.

Mr. HORAN. Is that 28 percent of those solids separate? Is it something you throw out as 28 percent of the whole milk?

Dr. HOLM. It is the amount of the solids in skim milk, whey, and buttermilk produced in this country in relation to all the solids in milk. In that 30 billion pounds of skim milk, 10 billion pounds of whey, and 2 billion pounds of buttermilk, there is enough protein to supply the average protein requirement for 30 million people.

Mr. HORAN. Is there any way we could get that to market and realize something out of it?

Dr. HOLM. Yes. The change has been going on for about the last 15 years. It used to be that processors produced cheese or butter or some other product, almost exclusively. The time has got to come, and it is coming, when every factory will produce all of these products. Then they can shift, as the market shifts, from one product to another. That is one of the main reasons why the chairman's section of the country is a little bit hard pressed now. It is a butter section.

Mr. ANDERSEN. Exclusively.

Dr. HOLM. They have got to be ready to make all products and get paid for all or nearly all of the milk constituents.

Mr. HORAN. Remarkable things can happen. We used to throw away knotty pine. Now it is one of our highest priced lumber.

FORESIGHT NECESSARY IN RESEARCH PROGRAMS

Dr. HOLM. As far as any research program is concerned, if you want the results tomorrow, it is too late to start today to get them. You have to look ahead to see what the people are going to need 5 years from now or 10 years from now because it is a known fact that research is about 5 to 10 years behind, you might say, from the test-tube stage to the industrial stage; about 5 to 10 years. So we have got to look at this research on a long time basis. We have to look into the future.

Mr. HORAN. That is true. That is why I asked where the norms cross. We have enough facts on hand now to make projections. For instance, we are looking ahead to population of 190 million. If the trend in dairy production continues downward, we are going to reach some point in the future where the norms will cross. Population increase will demand that we look ahead and protect the dairy producer today and we are doing that temporarily, as I understand it, with our support prices. At some time in the not too distant future, somebody in a responsible position has got to make up his mind about these programs and that should be based upon available facts. Research has been going on a long while and a lot of it is in this field.

PRICE SUPPORTS FOR PERISHABLES

Mr. WHITTEN. Mr. Chairman, I have listened to what has been said here with a great deal of interest. I know the deep feeling that this committee has had in the welfare of the dairy industry, as well as the real dependence which the American people have on a healthy dairy industry.

Dr. Reed, here are some factors which I think cannot be overlooked. We read in the press where by reason of price supports on butter we are pricing it out of the market; that perhaps is true. The other side of it is, as some have intimated, that the high cost of transportation, the high cost of distribution, and many other things have also contributed to pricing the farmer and the product out of the market. I think where you have had 11 freight-rate increases since World War II, you can clearly see where much of the high cost to the consumer is. The record shows that on many commodities coming from California to New York City, more than half the cost to the consumer is added after it crosses the Hudson River. But this firm price support at 90 percent of parity for a perishable is at best a temporary solution, if it is a solution; and I have been somewhat disturbed at the action taken.

FEDERAL ASSISTANCE TO INDUSTRY AND AGRICULTURE COMPARED

This is nonpolitical in that the original order was issued before the change in administration and the order was continued after. But I would like to put into the record at this point figures which are in the

record already showing that since we have had price supports for agricultural products, we have made a net profit since 1933 of $13,011,290 on basic commodities, and on nonbasics, which includes your perishables, we have lost $1,077,628,515. That is a mighty small loss as compared with the fact that we spent $4 billion for consumer subsidies during World War II, $40 billions in getting industry to convert over to meet wartime needs, $106 million in subsidies to maritime organizations since 1947, and $218 million for subsidies to airlines since 1951. When you look at the total picture, the amount of money that the Federal Government has spent in support of agricultural commodities is small as compared with what we have done to get others to enlarge their productive plant to meet the need that we have had since the beginning of World War II; and the losses there has been with perishables.

Mr. ANDERSEN. I want to add to that a statement made by Mr. Wells the other day that last year the Federal Government paid out $950 million in research to aid industry.

I would like to have the table which appears elsewhere in the hearings reinserted here because I think it would be of interest at this point as well as the preceding one.

(The table referred to follows:)

1. Losses under price-support program:	
Basics (profit)	—$13, 011, 290
Nonbasics	1, 077, 628, 515
Total (net)	[1] 1, 064, 617, 225
2. Federal expenditures for—	
Consumer subsidies (losses)	[2] 4, 204, 268, 768
Business reconversion payments (including tax amortization)	[3] 40, 787, 864, 000
Subsidies maritime organizations	[4] 106, 000, 000
Subsidies to airlines	[5] 218, 716, 000
Total	45, 316, 848, 768
3. Federal investment in—	
Military materiel	[6] 129, 000, 000, 000
Food and fiber (CCC inventories)	[7] 1, 118, 316, 908

[1] Since beginning of program in 1933.
[2] From July 1941 through June 1949.
[3] Since end of World War II.
[4] From January 1947 through Mar. 4, 1953.
[5] Since 1951, prior year figures not available.
[6] Deliveries of military equipment and construction since Korea totaled $48 billion as of Dec. 31, 1952. There are still in the pipeline $81 billion of goods on order for which funds are available. (Source: 8th Quarterly Report of Director of Defense Mobilization.)
[7] As of Dec. 31, 1952. Value of commodities under price support loan not included.

IMPORTANCE OF AGRICULTURAL RESERVE

Mr. WHITTEN. I think it is well for the American people to understand that with the threat of war and with the cold war going on throughout the world, we have invested $129 billion in planes, tanks, trucks, equipment, and other war materiel, in order to feel that we are safe to meet the emergencies which could arise.

At the same time, we have only slightly more than $1 billion invested in food and fiber to meet contingencies that might arise. All of that is shown in the table.

DANGERS IN FIRM PERISHABLE SUPPORTS

We are raising an issue as to whether this firm price support for perishables if kept too long might not be a means of discrediting our whole price-support system. This subcommittee, when we had price support on potatoes, was constantly after the Department of Agriculture to do away with such firm price supports when there was no control on the supply. I want to say that the Secretary of Agriculture was constantly trying to get legislative authority to stop it. Neither the Republicans nor the Democrats would change the law for quite a long time.

Having studied the provisions of the protective tariffs, the minimum-wage laws, the protection through the bargaining power of labor unions, and similar things which enter into our present economic system, I am firmly convinced that we need supports for agricultural commodities or the high cost of those factors will run agricultural returns into the ground. But I suppose if we are going to have a firm price support system, you must have some control over the supply. We cannot turn the supply loose and try to do it.

USE OF SECTION 32 FUNDS TO REMOVE SURPLUSES

I think we have said it here earlier—this committee is the one that insisted on the use of section 32 funds to support perishables and nonbasic commodities. That is the only way that I can see to meet such problems. We need to have a reasonable amount of money, and insofar as possible, buy up the surpluses and divert such surplus to good uses. We have a source of such funds in section 32 of the AAA Act which provides that 30 percent of the custom receipts shall be set aside by law to handle surpluses and promote new uses. We started that program, and as a result we have bought up perishables to the extent that we could and have diverted them to good uses. Last year this committee in its report directed that more of these funds be used by the Department of Agriculture to dry up surplus meats, eggs, and other surpluses in the field of perishables. Now, with an official order out to support butter at 90 percent of parity, a perishable, it could easily lead to another potato situation which could discredit our whole price-support system.

Now, I know the pressures that always exist in this kind of situation, but notwithstanding them, if we do not get this thing cured, it is going to jeopardize the whole support system. When we endanger the price-support system, we are affecting the food supply down through the years; at least that is my judgment.

UTILIZATION OF BUTTERFAT

Now, I would like to ask again if you can see any means of increasing the storability or diverting the fats to other uses, or any way to separate the butterfat and to remix it at a later period? For instance, now you have dried milk and you have butter. Is there any way to remix those so as to have a usable product; or do you run into the question of whether the market will accept it?

Dr. REED. Yes, there has been some work along the line of bringing them back together and making a product out of them. I cannot go

on too far with you on this question of supports just because I lack information; however, I do not think that the situation as between milk and potatoes is at all comparable.

Mr. WHITTEN. There is a great deal of difference. The point I wish to make is that if you don't find some use for it, the butter will lose its usability; it could end up in the same kind of situation that the potato program did. It inflamed the whole American people and it endangered our whole price-support system. The same thing can happen any time you support perishables without limit as we are in the field of butter. I come from an area where dairying is a large industry. We have no particular problem now because we sell fluid milk. I come from a cotton section where they are interested in firm supports for cotton which is storable. But I say that with basic commodities you cannot support a storable on a firm basis over any extended period unless you limit the quantity.

Dr. REED. That is right, sir.

PROBLEMS WITH PERISHABLE PRICE SUPPORTS

Mr. WHITTEN. Everybody knows that. When you support perishables indefinitely on a firm basis without any effort to control the production, you jeopardize the whole system. Since some folks have been advocating nonfirm supports or flexible supports anyway, excessive accumulations of perishables without corresponding control measures tends to discredit our price-support system.

I have met the Secretary of Agriculture. He is a fine gentleman and he impressed me with his sincerity and his willingness to study all angles. Certainly in my judgment he is no party to any such thing as that. But if present trends continue you will begin to see that some people who do not believe in a price-support system anyway are using this awkward surplus situtions as one of the ways to tear the support system down. Possibly the best way to destroy our whole firm support system is to get off into something where we lose large amounts of money.

Mr. HORAN. I think the point that ought to be made here is that perishables have to be consumed within a week to 12 months after they are produced and——

Mr. WHITTEN. You cannot support a perishable unless you also provide for its use after you support it.

Mr. HORAN. That is right.

Mr. WHITTEN. If we support a basic commodity we should see that it is used. Fortunately, many times you can keep some of it long years and thereby do not have to use it as soon. I saw where a bale of cotton in my district which was 35 years old was sold last fall. It brought within a few dollars of what the current price is for new cotton.

Mr. MARSHALL. Anytime that you do step in with a perishable support program, you disrupt the normal market channels to a much larger extent than you do with a storable commodity.

WASTE OF PERISHABLE SURPLUSES MUST BE AVOIDED

Mr. ANDERSEN. The immediate thing that concerns us is to consume the butter we are buying as soon as possible. What the American people do not like is waste of good food. They are not so much

interested in whether or not we put $150 million into this butter buying program, so long as that butter will go where it will do some good. I think you are entirely right on that, Mr. Whitten.

Mr. WHITTEN. There should not be support price for any of your agricultural commodities unless at the same time the program provides for the use of those commodities. As I say, with storables you do not have to use them as quickly, and it is good security in an emergency that might easily arise. It was a godsend in World War II. If we had not had these supplies ahead. I do not know what would have happened to this country. When you consider the total amount of products that we have set aside now to meet the emergencies in the field of agriculture, they are dangerously small as compared with what we have set aside in every other field to meet emergencies.

SUGGESTED DISPOSITION OF SURPLUS PERISHABLES

Mr. ANDERSEN. I have offered several suggestions for the immediate solution of the surplus problem in butter. First of all, let us contribute to the school-lunch program whatever quantity it can use without waste. That is the ideal point of consumption, in my opinion. Let us give to charitable institutions throughout America whatever they can consume. I would also enlarge that system, as I proposed 4 years ago on the House floor, to make butter and such perishables available through the county welfare boards to the old people in America who today receive what we call old-age assistance payments. There is a huge field there. Undoubtedly, those people do not consume what they should of this good food.

Then if we have any surplus after taking care of our own people in that fashion, we should ship it by the carload to friendly nations wherever there is an avenue of consumption, and where they have need for it. The main thing in my opinion is to store it no longer than is absolutely necessary.

Mr. WHITTEN. That, too, is not a permanent solution. We have to devise some way to improve the distribution and the collection system, the storability, and instead of emphasizing butterfat and butter which has been the only outlet for some of our sections of the country, we must see that fluid milk for which there is a ready market reaches such market.

Mr. ANDERSEN. The Bureau of Dairy Industry should undertake the long-term solution of this problem in conjunction with ARA and other bureaus.

Mr. WHITTEN. I still am not too sure that some of those who are opposed to a firm level might not have let their desires not to have firm price support, enter into this recommendation. They may have figured that we would waste so much money it would build up public sentiment and break down the support system. There have been folks who would like to see that happen anyway. So it is disturbing to me.

I attended a meeting of the National Women's Press Club a few days ago and one of the members wanted to know why this butter was not sold at half of what we had in it. Of course, that would also be a temporary solution only, because if the dairyman had to sell his butter at 50 percent of the present price and his only outlet was butter, it would not be 12 months before those milk cows would

be gone and beef cows or something else would take their place. So the public can't get butter at 50 percent of the cost of butter to the producer without the producer quitting the business. That is no solution.

UTILIZATION OF ALL MILK SOLIDS NECESSARY

Dr. HOLM. As I see it in this picture, the price support holds back the development of what the industry is going to need in the future. Those who are making this butter are quite willing to have the Government buy it and they just go back and make more butter. What we need in the industry is to find greater use for products in which we use all of the solids from milk.

Mr. WHITTEN. One of the complaints now in the cottonseed field is that too big a share of the value of the product is charged up to the cottonseed meal. That is particularly unpleasant when the price of the oil is down and when the hulls are not too much in demand. Too large a part of the total product is charged up to meal. Such meal is the finest of dairy feeds and this fact enters into the high cost of the dairy products in many instances, so the whole field gets complex. But any time any government, be it Democrat or Republican, sets out to support at 90 percent of parity any perishable on an unlimited basis, it is jeopardizing the whole support program. An emergency may exist to the point where you must do it temporarily, but it is not a permanent solution and you cannot support storables on a firm basis without also controlling the supply.

Mr. HUNTER. I would like to say that I agree with Mr. Whitten's statement.

DEMAND AND TESTS FOR NON-FAT-MILK SOLIDS

Mr. LAIRD. Dr. Reed, many of the leaders in the dairy industry, as the Chairman stated, feel that not enough effort is being devoted by the marketing research program toward attracting consumer demand for wider use of the nonfat solids. I would like to know how can the overall research program on the Federal level be more coordinated to give emphasis to this type of research? We are appropriating large sums of money but emphasis has not been given to the marketing problems.

Mr. ANDERSEN. Perhaps you would like Dr. Clarkson to answer that.

Dr. CLARKSON. I will try to answer that. Of course, as we point out so many times, the research that we carry on has to be on a continuing basis in order to furnish answers that are really usable. We are making an effort now to see what can be shifted toward the problem of marketing of dairy products, but we are not going to be able with that shift to answer today's problem today. Now, we will do the best we can with that shift of emphasis but it will be on a long-range basis, of course.

Mr. LAIRD. Over 12 years ago, Professor Froker, now Dean Froker, of the University of Wisconsin College of Agriculture, came up with certain proposals in the dairy field and he predicted at that time that eventually the butter substitutes would be placed in such a position that the butter industry would have to face up to the problem of competing much closer on a price basis with the butter substitutes.

He felt that this could be done if the method of giving primary emphasis to the butterfat content of milk was changed to placing more emphasis on the nonfat solids. During that 12 years we have not developed what is considered by most people an adequate simple test for the nonfat solids contained in milk. Has that been worked on in the past 12 years?

Dr. HOLM. May I answer that question? The answer is, "Yes." We have a practical test now, which we have been working on for the last 2 or 3 years, by which we can determine solids within one-tenth of 1 percent.

Mr. LAIRD. I realize that this thing has been speeded up because of the actions back in the 81st Congress when the dairy farmer lost his protection for his butter. The competition for the consumer market between butter and butter substitute was speeded up by the actions of the 81st Congress. You have developed a new Babcock test for butterfat to replace the old Babcock test during this period. We need a simple test for nonfat solids. You may be satisfied with the present test but I feel you can help to improve it. As far as butter consumption is concerned, I think it is interesting to point out that the butter consumption was greater than the butter production in 1952. Butter consumption was 1,360,000 pounds while butter production was approximately 1,200,000 pounds in 1952.

It was mentioned here the fact that the ice-cream market had been lost for butterfat to some extent. This loss is a temporary loss. The new methods of using tallow and other butterfat substitutes seems to be gaining some acceptance in the ice-cream industry.

Mr. HORAN. Did you say tallow?

Mr. LAIRD. Yes.

It is true that in the production of that ice cream the nonfat solids from milk are still being used and are not being compensated, I feel, adequately. They are a necessary part of ice cream. I feel the dairy industry should be given more consideration for these nonfat solids.

Dr. REED. As I outlined this is what we have been working on but we have been stymied the last few years, because of limitations on junior staff members to help our top scientists. We could do a lot of work along that line. I might add here, since you have asked about this commodity. I met with the commodity committee out in California. The committee is made up of representatives from Wisconsin and Missouri, the East and the Northwest. This subject, of solids content of milk, that we are discussing now was one of prime consideration of the committee at that time. We all had the same idea of what the big problem is. We have initiated a project recently in cooperation with the American Dairy Association and the University of Maryland. They have provided some money to work on this test. This work was the subject of discussion because we realized just as you realize that this is the big, important problem right now.

Now, I understand that on the basis of Dr. Froker's work there are a small number of milk plants that are using his method of paying for the milk.

Mr. LAIRD. A large number of our major plants in Wisconsin are now using the new method to some extent.

Dr. REED. But what we still need is this short practical test to obtain an accurate measure of the milk solids. We have been working on that. How long have we been working on it Dr. Holm?

Dr. HOLM. About 2 years.

Dr. REED. About 2 years on that problem. We have anticipated some of these things and we are willing to assign all available employees we have to some of these emergency problems. That is exactly what we did when work on the pasteurization of cheese became urgent.

Mr. ANDERSEN. Exactly on that point, Dr. Reed, even though you do not secure additional scientists, certainly among the 31 you have working on research, you should be able to find 2 or 3 to work on this problem, if it is serious.

Dr. REED. We would have to stop something else.

Mr. ANDERSEN. Perhaps you could curtail something that is not so important.

COOPERATION WITH OTHER RESEARCH ORGANIZATIONS

Mr. LAIRD. Mr. Chairman, I am wondering if you are sure that all the hands available are being used. I am well acquainted with the University of Wisconsin research setup because I have long been interested in it. I wonder if all hands are being used in cooperation with the work at our new Babcock Laboratories at the University of Wisconsin.

Dr. REED. I have mentioned one project that we finished last year with that dairy department and now we have another project going on at the present time. That is on cheese. A number of the cheesemakers, particularly the Swiss cheesemakers, and Wisconsin produces more Swiss cheese than any other State in the Union—maintain that they cannot make good Swiss cheese out of milk from cows fed grass silage. We have set up an experiment in cooperation with Wisconsin to solve that problem; and they are working on some of these similar problems that we are talking about here. They have, I believe, got some money recently from the ADA to augment their research funds.

Mr. LAIRD. How does this committee, this interagency committee that we spoke of, Dr. Clarkson, cooperate with the work of the research laboratory down at the University of Wisconsin?

Dr. REED. This overall committee? There has not been any direct contact although a member of the Office of Experiment Stations is on this committee. The contacts for cooperative research in the dairy production and milk products fields are made through our bureau with the University of Wisconsin and the University of Ohio, and the University of Maryland and others where we are working. The requests of States, when we get together to discuss these problems, are initiated by either side or by both working in cooperation.

Mr. ANDERSEN. Dr. Clarkson wanted to comment on that.

Dr. CLARKSON. Dr. Reed really did answer it but this working group is set up with the Department, within the Department to make sure that the recommendations and views of this industry advisory committee are thoroughly considered by the agencies within the Department who have responsibility. As with Dr. Reed and his group, they will make these contacts with the university and other places, experimentations where the work can be done.

Mr. LAIRD. I do not mean to be provincial in these questions but I am acquainted with the work being done in Wisconsin, Mr. Chairman, and that is why I refer to Wisconsin.

Mr. ANDERSEN. I think you are pursuing an important line of questioning.

Mr. LAIRD. Our State legislature has not refused or reduced an appropriation request of the University of Wisconsin insofar as dairy research is concerned.

As a matter of fact, the new laboratory was built there at a high cost to the State and is a dairy research plant which is second to none. To my knowledge we have never refused a request for an appropriation in our State legislature for any work that the College of Agriculture wished to do in the field of dairy industry. It seems to me that we have a setup in Wisconsin and that there should be real cooperation between your work and their work. There should be cooperation on the Federal level, with this interagency research committee that you have set up, and the work that is being done at the University of Wisconsin. I point this out because I would like some assurance that there was going to be that type of cooperation.

Dr. HODGSON. May I say, Mr. Chairman, that in addition to the cooperative work with the dairy products people at the University of Wisconsin on the cheese project, we have two other cooperative projects, one in dairy cattle breeding that is conducted at the Lake Mills station, and another project that is conducted in cooperation with Dr. Casida of the genetics department on certain problems related to sterility in dairy cattle. We appreciate the fine staff and facilities they have there and have found it is possible to cooperate with them in a very effective way.

Mr. LAIRD. As we look over the uses of our total milk production in this country, we find that about 55 percent of it is used in bottled milk consumption and that 10-percent increase in the consumption of bottled milk, would take care of any surpluses which we now have at the present time. In working to eliminate the present temporary surplus problem that we face today we are going to have to receive the best cooperation from the various marketing outlets. We can increase this bottled milk consumption by 10 percent but since the World War II with 11 freight increases and other marketing cost increases it has been difficult to bring consumer cost down. What research work are you doing to minimize the effect of these marketng cost increases?

(Discussion off the record.)

Mr. LAIRD. I would like to know what your men have been doing and where you have used these men during the past 2 years.

Dr. REED. On a new test to replace the present butterfat tests, we have used two chemists for the past 3 years.

Dr. HOLM. Some years ago, when the various States began passing laws concerned with the pasteurization of milk which goes into cheese, we were approached by the industry and by the Food and Drug Administration on methods of detecting whether a cheese was made from pasteurized milk or not. We took up the project but we had to assign two men from the cheese work to do it. They spent 2 years on that problem and came up with a method on which we can depend—we can detect 1 pound of raw milk in 2,000 pounds of pasteurized milk, through the cheese produced. On dried-milk work we have only one employee. The Armed Forces asked for information on two problems, one of them low-fat dried milk, and the other a reconstitution problem. We have one employee part time on these problems.

In the concentrated-milk work, information was requested by the Quartermaster Corps and the Evaporated Milk Association on some fundamental problems. We have no men to work on it, although the concentrated-milk problem is probably the most important problem at this time because its satisfactory solution could make this product the balance wheel for the industry.

A project on foreign fats detection is on the books; we have been doing no work on it. In other words, if we have a new project we have to take an employee off some other project in order to carry on the new work. In the work on the fat test, we assigned an employee who was doing work on cheese. In the work on solids-not-fat, we have one employee who also devotes time to another problem. In other words, we are down to the point where if we take up a new problem we have to drop some work on another project.

Mr. HORAN. I think it would be pertinent to ask if your contractual authority is inadequate. Can you use that contractual authority to protect the work that you have just testified you felt was so important?

Dr. HOLM. I do not know about the situation on that score, sir.

Dr. CLARKSON. That would be tied up with availability of funds also, Mr. Horan.

Mr. HORAN. You have them in R. and M., and what is involved here is that other departments ask you to do certain work for which you are robbing essential projects. Presumably, the funds are to come from the military. If this is important to the military, they should certainly transfer funds to you. We have reason to believe that you know of adequate people who could be hired under contractual authority to do this and continue your own work.

Dr. HOLM. On the fundamental work on evaporated milk, 12 years ago there was a problem that the Armed Forces was very much interested in. They were interested in having an acceptable concentrated milk for use not only in the field but in canteens and so forth. There would be a great saving as far as shipping was concerned.

Mr. ANDERSEN. Do they transfer funds to you to do that work?

Dr. HOLM. We approached them on the question of funds for doing the fundamental work, so that we could set up a team to work on the problem. The quartermaster corps of the Army evidently had no money to devote to this problem.

LOWER BUTTER-FAT PRODUCING COWS

Mr. LAIRD. I think the chairman in his district has a problem, of course; I remember well my father telling me about when he was a boy. He remembers that in the wintertime, when they did not come around to collect the milk, they would separate out the cream and dispose of the rest. Today, we find ourselves in a different situation where we can separate out the cream but find a better market for the other solids in the milk. That is why there has been a change to the Holstein cow throughout the dairy areas. What consideration and research work has been done toward improved breeding of a dairy cow along this line?

Dr. REED. We have a low-fat breed now, and it is increasing in popularity because the fellow with the cow producing high-fat milk is not getting wholly paid for butterfat he is producing. The im-

portant thing is to have a cow of any breed that will produce a large volume of both fat and solids-not-fat.

Mr. ANDERSEN. Does that mean that the Jerseys and the Guernseys are gradually going out?

Dr. REED. I understand in some sections they are reduced considerably. I understand in your own State there is a trend in this direction. I don't know how significant the trend is.

PRICE SUPPORTS STIMULATE EXPANDED DAIRY INDUSTRY

Mr. LAIRD. That is the trend in Wisconsin. Doctor, what are the figures in the last few months as far as any shift from beef production on the part of farmers into dairy production because of the support program for dairy products?

Dr. REED. We have no figures, but I notice that there is some shifting, back to dairy cattle. I do not think there is any question but that it will continue. I want to be an optimist on this dairy business, but there are times, such as we have just gone through with the high price of meat and so forth, when the fellow with a small herd of cows was having difficulty in making much profit. He naturally traded what he had and went into other breeds. Practically every artificial-insemination association was organized for the dairy farmer. Now practically every one of them in the United States contains some beef bulls, but the demand for breeding the cows comes from the dairymen mostly.

Mr. LAIRD. About 30 percent of beef production comes from dairy production.

Dr. REED. More than that, with veal et cetera included. There has been an increase in other cattle which lowers this percentage; it was more than 40 percent a few years ago, but with the increase in beef-cattle numbers it may now be more nearly 30 percent of the total meat supply coming from dairy cattle. I think this type of shift is bound to take place.

Mr. LAIRD. In the dairy-herd-improvement program, are they following the recommendations being made throughout the country as far as culling out their herds, or have they stopped doing this?

Dr. REED. We have a program, just as strong as we have ever had it, to cull the poor producers.

I would like to say one more thing along the line of what has been said on the whole question of paying for solids-not-fat, or putting more of the weight on the solids-not-fat. I think it ought to be recognized that the nonfat solids do have value. At the present time we are paying for our milk largely on a butterfat basis. Little or nothing is said about the other solids. The pricing so far as I know, has always been based principally on butterfat content.

We have done a lot of thinking and have done some research in trying to get more weight placed on the solids-not-fat. Our home economists have continuously worked on the program of getting more of our solids-not-fat into the gullets of the human family and I feel that in the greater utilization of these solids in foods is where our biggest future lies.

I talked about fluid milk. The only farmer under our present manufacturing setup who is not going to benefit fully from a development of this kind is the man that the chairman has referred to. He is where

there is nothing but a butterfat market at the present time. Many of these communities do not have a dry milk plant. This situation exists all through Kansas and Nebraska, but I feel very definitely that the industry is going to change this situation. I think we are going to have processing plants out there that will not only process the butterfat and the milk but are also going to be receiving stations. There is no reason why if they have a good water supply, a milk factory to process all the milk solids should not be located in central Nebraska or somewhere out there. We have not kept up with our transportation facilities.

Mr. ANDERSEN. If Mr. Laird will permit, the only question in my mind is whether that shift will be enough to do the job.

Dr. REED. That is a thing we have to conjecture about. I was in California not long ago and found that it is about the only place in the United States where they are not complaining about surpluses. They never did make all their butter, but obtained it from the Northwest. However, following up the program that the Bureau started many years ago, on cottage cheese, I found one company that makes a specialty of good cottage cheese. This company is making 25 million pounds of cottage cheese annually and selling it in its own area. So industry does take these things up sooner or later although as Dr. Holm has pointed out, the things that we are working on today might not really get out into the industry for 5 or 10 years.

NEW CHEDDAR CHEESE PROCESS

Mr. LAIRD. How long before the "short method" cheesemaking process will be out in the field?

Dr. REED. I think that is going to be the exception to the rule. Cheese producers have taken notice of this work. Some of the largest cheese producers in the United States are anxious to know when we are going to release the method. As soon as we release it, I think many will take it up because I am sure the implication economicwise is tremendous.

Mr. LAIRD. I do not mean to be taking up too much of the committee's time, but I would like to know more about this cheese process.

How long do you think that will be before it is out in the field?

Dr. REED. What about it, Dr. Holm?

Dr. HOLM. We are going to release it just as soon as we get the filing date of the patent, which we hope will be in the next 2 months. I imagine it will be in use before the year is over.

Mr. LAIRD. Do you find the taste of the cheese is pretty well carried over from one batch to another?

Dr. HOLM. Very uniform.

Mr. LAIRD. Do you think there will be more uniformity as to quality between plants?

Dr. HOLM. I think there will. With improvements that have been made in the last 10 years in knowing how to keep evertyhing clean, how to handle cultures and so forth, I think they are ready for something like this.

Mr. LAIRD. Have you followed the suit in Federal court in Wisconsin now on the development of rindless process?

Dr. REED. Yes; we have been following that.

Mr. LAIRD. The Kraft Co. contends that it is their patent and the State of Wisconsin contends it belongs to everyone.

Dr. REED. We have had some experience along that line. That is why we are so anxious to protect the method for use by the small as well as by the larger producers.

Mr. LAIRD. I do think that is important from the experience we have had in Wisconsin where the State did work on this for a good many years. Kraft came in and took over much work that the State had done and got a patent on it and now it is to the detriment of other swiss cheese producers in our State.

Dr. REED. We have had similar experiences, not with this problem but in other work.

CULLING UNPRODUCTIVE DAIRY COWS

Mr. HORAN. At what point under our economic law does a cow become a cull in terms of butterfat or milk production?

Dr. REED. That is rather difficult.

Mr. HORAN. We are at a point now where I suppose it is still true that the more he produces, the better off he is economically, or is that true?

Dr. REED. Well, you get to a point of diminishing returns. If you keep on feeding more and more, you reach a point where the output per unit of input decreases to a point where it becomes less profitable. There are many factors that you have to take into consideration to answer that sort of a question. A cow that produces 200 pounds of butterfat when butterfat sells at 80 cents a pound may not be a poor animal, but if butterfat is down to 50 cents or 30 cents a pound and grain and other feed fed to her is expensive, she may be considered a poor cow; a cull. It is a difficult question to answer, but I think that a cow that produces around 300 to 350 pounds of butterfat is making a profit for her owner, but below that figure you are not making much profit right now.

Mr. HORAN. Surely there must be benchmarks by which a herd manager decides to take action at some given point.

Dr. REED. Under his own conditions.

Mr. ANDERSEN. That is about it, under the man's own conditions.

PRICE COMPETITION OF BUTTER

Mr. LAIRD. Mr. Chairman, in my question I did not mean to point up the fact that only in cheese and in nonfat solids was the future of the dairy industry, I still believe that butter is a product of the dairy industry that is going to be in demand and even more in demand in the future than it is today. I think that butter must compete more with substitutes on a price basis and it undoubtedly will if we can put greater emphasis on nonfat solids. It will then far outsell any substitute because it contains nature's own vitamins and they do not have to be pushed in there by some other method. I wanted to point that out. I still feel that butter is going to be a major product and that our consumption instead of being 8.8 as it was in 1952 and butter substitute 7.8, will someday get nearer the ratio of 15 to 1 as it was a few years ago.

It does not have to sell for the same price as a substitute but it has to be more competitive on a price basis in order for us to regain the market.

Dr. HODGSON. Should we not say that butterfat will continue for some time to be the principal fat in ice cream? There was a suggestion earlier that the market for butterfat for use in ice cream has been lost.

Mr. LAIRD. Part of its market has been temporarily lost. That is what I intended to point out. I don't think that the dairy industry has lost this butterfat market forever.

PER CAPITA CONSUMPTION OF MILK

Mr. MARSHALL. In your general statement, Dr. Reed, you were talking in terms, as I read your first paragraph, of the per capita production of milk. I wonder if it would be possible to furnish for the record the per capita consumption of butter and per capita consumption of milk for the past 10 years.

Dr. REED. I think we can get that.

Mr. MARSHALL. I think that would help us in our record.

Mr. ANDERSEN. We will have that inserted at this point, if you can furnish it, Doctor.

(The information requested is as follows:)

Per capita production and consumption of milk and butter, United States, 1943–52

Year	Milk		Butter	
	Production	Consumption [1]	Production	Consumption
	Pounds	*Pounds*	*Pounds*	*Pounds*
1943	856	762	14.6	11.8
1944	846	774	13.1	11.8
1945	856	804	12.1	10.9
1946	832	813	10.6	10.5
1947	810	787	11.3	11.1
1948	768	751	10.2	9.9
1949	778	761	11.3	10.4
1950	769	731	10.8	10.7
1951	744	709	9.4	9.6
1952	733	695	9.1	8.7

[1] Data beginning 1950 not comparable with those of earlier years.

FUTURE TREND OF DAIRY INDUSTRY

Dr. REED. I would like to say as a matter of record that I am one of the world's greatest optimists on the dairy industry. I think it has a tremendous future and nobody can gainsay, to me, that it hasn't a great future. We are going to have butter for many many years to come. I think that through our development of our dairy industry in this country, by 1975 we are going to have cows in this country that will average close to 7,000 pounds of milk. I can't help but believe that. I feel we can project that in a very definite way. We are optimists, although we do have these disturbing factors that arise. We forget why butter is where it is today on a competitive basis but our research is going to be directed to work out a plan which will place butter more nearly on a competitive basis with other fats. This will have been done when we get acceptance for things that are even yet not worked out on the use of solids, nonfat solids in bread, in ice cream, and in other products.

Mr. MARSHALL. At the present time, my section of the country, the Midwest, has been faced with a problem of conversion to make the best use of market trends, and on top of that we have had to face what appears to us to be quite unfair competition in certain sections of the country. People through marketing agreements have pretty well taken the fine quality Midwest milk out of the market, and at the same time they have been able to divert their overflow into butter which is highly competitive with our butter. So we are faced with two extremes, one a matter of dealing with what to them is more or less a surplus product and also finding that our market as far as dairy products are concerned is somewhat limited. However, John Brandt, a leading dairyman in Minnesota, who, as you know, has passed on, was interested in a spread that his organization was trying to develop that would be, as he said, more competitive, requiring less butterfat content, using a portion of butter.

Do you have any comment to make on that?

Dr. REED. We do know that there is quite an effort being made along that line, not only at present but during the war. We had several samples sent in to us that were made with foreign fat and with butter and other products in it. I know Land O'Lakes have been working along that line.

Dr. HOLM. Those efforts have been made, and they never seem to take a foothold. It seems that when consumers desire a spread they prefer butter or mayonnaise or something like that. These other spreads have never gained a foothold. They might if they were promoted.

Dr. REED. We have not done work on those lines where spread is concerned.

Dr. HODGSON. Except in work on the recovery of proteins from cheese whey and mixing that fine protein material with cream or butter, we have made a spread that is somewhat similar to those you are considering. This makes a very good spread and contains a lot of proteins as well as butterfat.

Mr. ANDERSEN. I think it would be fine if we could accomplish something of that nature.

BREEDING FOR NONFAT SOLIDS

Mr. MARSHALL. I was very much interested in my colleague's remarks about the tests of nonfat solids and the developments along those lines. I was particularly impressed with the statements that have been made about the future for nonfat solids. You will be appearing later on in these hearings making a request for the Dairy Herd Improvement Association, and I am wondering if you could not give us some information either now or perhaps at that time concerning what your efforts in the Bureau of Dairy Industry are toward directing that sort of test of herd improvement. Rather presently most of the emphasis is on milk production and butter-fat content. It would seem to me there is some possibility that in dairy herd improvement work that butterfat may be overemphasized, judging by what you have talked in terms of here.

Dr. HOLM. We are going on with the work on this test. The present state of it is that we have just finished as far as the basic laboratory work is concerned. We are now going to find out the

reliability of the test on all types of milk during all seasons of the year with different breeds, and so forth.

Mr. MARSHALL. You are contemplating, I take it, if these tests bring out some merit in the idea, that you are going to emphasize that in the Dairy Herd Improvement Association?

Dr. HOLM. I do not know. However, it could serve to provide further information on the milk produced.

Dr. REED. We have not considered that, but I don't see any reason why selection should not be on the solids basis, taking into consideration fat and solids not fat, at least in a limited way. I see your point—that we would like to know what the values are on both the fat and nonfat solids basis. We have not been doing this. Demand has not been for it. Demand has been on the milk and butterfat basis, and we consider both of these in evaluating a proved sire.

Dr. HODGSON. That raises the question as to the advisability of taking up breeding research to determine what the possibilities are of developing strains of cattle that produce higher percentages of solids and solids not fat.

Mr. MARSHALL. We might be on the threshold of quite a transition period as far as dairy breeding is concerned.

Dr. REED. I was at one of the dairy experiment stations in England a couple of years ago, talking with the director there along this particular line. He said that he had evidence that the nonfat solids in the average milk in England was decreasing and that they were greatly disturbed about it and that they were going to do a lot of selecting of animals to try to increase the nonfat solids in milk or select the animals that produced a high percent of solids not fat. They were very definitely worried at that time.

We have paid little or no attention to it in our research work in this country.

BUTTER PRESERVATIVES

Mr. MARSHALL. I have been informed that some of the spreads that come in competition with butter have preservatives put in their spread to maintain a quality. This butter manufacturers do not do.

Dr. REED. They are not allowed to do it. These products have to comply with the food and cosmetic law under the Food and Drug Administration. That is one of their continuous problems.

Mr. MARSHALL. It has presently reached the stage that it is one of their most difficult problems in reaching competition.

Dr. REED. That is true.

Mr. MARSHALL. Have you been making any recommendations in the Bureau of Dairy Industry along the line of making some change in order that dairymen can meet competition in the fair and open market in that regard?

Dr. REED. With spreads?

Mr. MARSHALL. Yes.

Dr. REED. We have not worked on these kinds of spreads at all any more than we have worked on oleo, you see.

Mr. MARSHALL. That wasn't what I was meaning to ask in my question. My question was that you are working with butter and you are attempting to make butter acceptable to as many consumers as possible. Butter presently is under the handicap of not putting a preservative in their product in order to compete with other spreads

that due use preservatives. What is your recommendation along those lines?

Dr. REED. If we have a good raw product from the farm and a good creamery, I don't think we need to add anything to preserve our butter. One of the big handicaps in the butter industry today is that a lot of low-quality butter is being placed on the market.

Mr. MARSHALL. The housewife may not entirely agree with that. She opens up a pound of butter, leaves it in the refrigerator for possibly 2 weeks and then comes back and uses that butter which is not as tasty as it was.

Mr. LAIRD. Something is wrong with that butter; this is not the case with good butter.

Dr. REED. It depends on temperatures and other conditions in the refrigerator. I think I know what you are talking about. Some of these other spreads, that take the place of butter, are spreads which contain certain products which might be put in butter. We are not allowed to put them in.

Mr. ANDERSEN. Gentlemen, we will recess until tomorrow morning at 9:30.

THURSDAY, MARCH 12, 1953.

Mr. ANDERSEN. The committee will come to order, please.

DAIRY HERD IMPROVEMENT PROGRAM

Doctor, I notice that you are asking for an increase of $124,945 for dairy herd improvement work. Will you give the committee a picture of the immediate future relative to this?

Dr. REED. Mr. Chairman, speaking of the future, we judge it by what has happened in the recent past. In the last year, we have had an increase in the number of cows in herd improvement associations in 1952 over 1951 of more than 60,000 cows.

Mr. ANDERSEN. Will it be necessary to anticipate that this work will continue to increase in volume, or will there eventually be a leveling off of this workload?

SIRE PROVING PRODUCTION RECORDS

Dr. REED. Mr. Chairman, that is exactly what we have in mind, and we hope that this will level off in the not too distant future. We are making an agreement with the States which we have never had before, with the extension services, to put this whole herd improvement program on a little firmer basis. Then we anticipate if we get an increase in funds, to set up some definite research work out in the field to see if we cannot work out a plan so that we can use only records from certain herds which are continually maintained under uniformly good environmental conditions that would be selected in the States for use in the sire proving program. This is not the question of selecting cows; please do not misunderstand me on that—but a question of selecting herds where the conditions in the good dairyman's herd are dependably good, where the cows will be treated in the same manner as their daughters when making their

production records. This may give us a more definite picture and a more accurate record to use as a basis for proving bulls.

We think that we may be able to set up a program whereby we select herds for sire proving. Under such a plan we would only be processing the records from particular herds and not attempt to process all the records that come in. It is a well known fact that the States send in a lot of records which ultimately are not used in proving sires. Some of the records received have to be sent back for correction. Last year we sent approximately 20,000 records back to the States for correction. We think that we can eliminate much of this, but to do it we have to develop some facts on which to base our plans and work in cooperation with the extension services in the States.

COOPERATION WITH STATES

Now, the States are interested in this. For instance, the States likewise have taken steps to improve their own record systems. But it is necessary to keep this on a coordinated, national basis. We should experiment, perhaps with three selected States where there is a large amount of testing going on now, to select these herds and prove the bulls used in them to see how such a plan would work.

PROCEDURE IN COMPILING DATA

We believe that if we select a number of these herds—I do not know what the number would be—that we could prove all the bulls that are needed in artificial insemination and for other uses from those particular herds. There would have to be a standard setup as to what herds we could use in such a program. As a dairyman, you know that many farmers are able to maintain a uniform level of production year after year because their feeding and management is kept uniform. Others do not. Environment has a big influence on the record a cow will make. It is only where those environmental conditions are controlled to a high degree that we can get the true facts that will help us appraise the genetic worth of a bull on which we develop a proof.

Mr. ANDERSEN. Doctor, I notice that the data for proved sire records is about 2 years in arrears. That gets to be a dangerous point, does it not?

Dr. REED. That is right.

Mr. ANDERSEN. Because a lot of these proved sires may go to the slaughterhouse before the records are completed.

Dr. REED. Exactly. Not only that, but the average life of a proved bull in artificial insemination, after he is proved, is only about 4 years. Now, we have already established a little variation in our practice in order to try to meet this situation. We have given priority to certain bulls that the State extension dairymen have recommended sire proving be made on. We lift out of this backlog the records of these bulls, daughters, and their dams and develop a proof on them. Last year we did a lot of that because there was such a big demand for it from the State people. This is an expedient procedure but we do not think it a good replacement for proving all the bulls for which we have data. We should arrive at some sort of a procedure whereby we can get only the amount and kind of information that we need for this work.

FINANCING EXPANDED PROGRAM

Mr. ANDERSEN. Would the States want to collaborate in some way such as charging a fee for this work to enable you to extend your work and keep up to date? I think something of that nature would be very good. I do think, that the entire work should be under the supervision of your Bureau. At the same time it would be desirable if we could enlarge the work without further Federal assistance but rather through fees from the people who benefit directly from the processing of the records. Have you gone into that?

Dr. REED. We have given some consideration to that, but not too much.

DEVELOPING IMPROVED METHODS FOR PROVING SIRES

The people who benefit from a proved sire are not particularly the men who own the proved sires. If a dairyman has a sire, that is proved meritoriously, of course the sire becomes more valuable.

Mr. ANDERSEN. Exactly.

Dr. REED. But the value of using proved sires is wider than that because it is the fellow who breeds, through artificial insemination or otherwise uses a particular sire that has been proved, who benefits. By and large on that basis we are trying to raise the level of production of our dairy cows in this country. That is what is going to happen with the use of proved sires. But I think that we must look forward to developing improvements in our methods for proving sires that will be less costly and so that we will not have to be working with a continually increasing number of records. They increased last year, as I said, by 60,000 more records than there were the year before. The records received have been on the increase. What we want to do is be more selective.

Mr. ANDERSEN. Doctor, how could you be more selective and yet not harm the breeders?

Dr. REED. Well, as I said a moment ago, we would have to set up some kind of a standard and get agreement through our States on that standard. For instance, on such a program, we would not be in the position to take all the herds now on DHIA but to select those that meet certain standards agreed to by the State workers and the Bureau. Herds that could meet these standards would be in the program of sire proving. If such a program proved possible, I believe we could provide the needed proved bulls and we would have better proofs on them. At the same time we would have fewer records to work on.

Mr. HORAN. Are you talking about purebreds?

Dr. REED. All cattle. This is established across the board for all cattle, purebreds and grades alike. As a matter of fact, to answer your question more definitely, during the last few years we have had more farmers with registered cattle send us records than farmers with grade cattle.

COOPERATION WITH HOLSTEIN ASSOCIATION

Mr. HORAN. We once had a nice purebred herd of Holsteins. We fully tested them but the records were not kept by the Government. They were kept by the Holstein Association.

Dr. REED. Those were what you call advance register records.

Mr. HORAN. They might have been. What is the cooperation there in this herd-improvement work?

Dr. REED. In the herd-improvement work, since the time you were in the business, the Holstein Association, in about 1926, inaugurated a plan of testing all the cows in the herd instead of just a few selected animals. These Holstein-herd test records are obtained in close cooperation with the herd-improvement associations. The Holstein association and other breed associations furnish us their records to add to ours for use in proving bulls. In total we have many, many more records than do the breed association because we use records from both purebred and grade cows.

Mr. HORAN. If that is true, Dr. Reed, you started out with pretty good background in 1926, did you not?

Dr. REED. Oh, yes.

Mr. HORAN. Based on the association of purebred breeders.

Dr. REED. Certainly, but when I talk about background, I think of records on a herd covering a period of several years. We have new herds coming into the testing work each year, for instance, like the 60,000 additional cows tested last year in new associations. They have never been tested before. New herd owners will start in because they see the benefit of the program.

ESTABLISHING FEEDING STANDARDS

It would be helpful if we could set more stringent standards for those dairymen participating in the sire-proving program. For example, they should attempt to keep the total digestible nutrients that the heifers consume comparable with that which the dams consume. If they do not feed the daughters as well as their dams were fed, the records may show the bull was not proved favorably. If, on the other hand, daughters are fed better than their dams, the proof may be unusually favorable. Such proof may not be entirely sound because we may be judging level of feeding in the two instances instead of inheritance of the bull. Therefore we need to set up better standards. We have given a lot of consideration to this problem, but it is still in the planning stage. As I said a moment ago, we are suggesting an agreement with the States whereby the feeding standards might be established.

Mr. HORAN. That is one of your controls.

Dr. REED. Environment controls.

COOPERATION WITH DAIRY BREEDING ASSOCIATION

Mr. HORAN. What I should have asked was what your present-day cooperation is with the various breeding associations, like the Holstein breeders, with which I am familiar. I assume that the same is true with the Guernseys and Ayrshires and Shorthorns, Brown Swiss and your Red Danes and all of those that they may have some background on. We know that they are rather jealous of their position and trying to maintain the efficiency of their particular breeding stock. Certainly this committee should know what you are doing, either through contractual relationships or through cooperation which I know you must have.

Dr. REED. We have 100 percent cooperation with all of the dairy breeding associations. Take, for instance, just as an illustration, the

Jersey association. They have a setup up there with punchcards where they are getting certain records that they want for their own breed program. They get a lot of these records from the herd improvement associations that come into our office. They get other records that are made under their own breed-testing program and these are sent into the Bureau for use in our sire-proving program. They send us all of their herd-test records because we are interested in getting all the records possible to prove bulls.

CONTROLLING ENVIRONMENTAL CONDITIONS

Mr. HORAN. That is right. You use the controls of fixed feeding ratios, do you not, both on the dams and the daughters?

Dr. REED. We have not done so in the past.

Mr. HORAN. You are going to do that now?

Dr. REED. That is what we want to do in this experimental work to see how we can establish better standards.

Mr. HORAN. That is a control the dairyman himself might not adhere to.

Dr. REED. He would agree to the standards that would be worked out. He would have to agree to that or his herds would not be selected to prove bulls. In other words, these would be marked farms, not marked cattle, but marked herds where the environmental conditions would be controlled. It is on those farms that we really get proofs on bulls that are most worthwhile. Just as an illustration, we have been proving these bulls and publishing the results. In our literature that goes to the public we admonish the users of the data to visit the farm where the bull was proved and evaluate the environmental conditions under which the dam and daughter records were made.

The environmental factors must be considered if full reliance is going to be placed on the bull proof. We have been doing a lot of thinking on this problem. As a matter of fact we are ready to start with two States in studying this problem where they have a large amount of bull-proving work and cows on test.

Mr. ANDERSEN. What are those two States, Doctor?

Dr. REED. We had tentatively considered, since they have such work, Wisconsin and perhaps New York or Iowa—those are among the three leading States. We want enough duplication or replication so we can depend upon our results when we get them.

Mr. ANDERSEN. I do think they ought to be separated enough geographically so it will give you good information.

Dr. REED. Perhaps one in the Southwest.

Mr. ANDERSEN. Or one pretty well south.

Dr. REED. Yes, that is our plan because we realize the high cost involved if one lets the program grow indefinitely.

DAIRYMEN TO SHARE COST

Mr. ANDERSEN. That sounds logical. We have frequently questioned as to why you cannot collect a fee for this service to be applied against the cost of this huge volume of clerical work.

Dr. REED. We have not given any consideration to that but we can.

Mr. ANDERSEN. That same situation prevails all through the Government. The Federal Government gives worthwhile services to

various groups and it would be desirable if these services could be extended through some means other than out of the Federal Treasury. This is one example of it, I believe. You should have access to more funds.

BENEFITS OF THE DAIRY HERD IMPROVEMENT PROGRAM

Dr. REED. Mr. Chairman, I say that this dairy bull proving program is a little exception to a lot of other inspections that are carried on at the behest of the Government. This program has a direct relationship to the raising of the average level of our production per cow in this country. In the end, the farmer will make more money and the consumer will benefit by a plentiful, low-cost milk supply.

Mr. ANDERSEN. I see from your notes that since you have commenced this work, the average milk production per cow for the entire Nation increased from 4,700 pounds to 5,300 pounds. That in itself indicates the value of the work.

Mr. LAIRD. Can you attribute the entire increase to the keeping of these statistics?

Mr. ANDERSEN. Well, I think to a large extent you can Mr. Laird. Of course, the cow-testing associations have had a big influence.

Dr. REED. You cannot attribute the entire increase to the program. However, I am inclined to believe that you can attribute most of it to breeding because, first of all, you need a cow capable of producing large amounts of milk. You have to have good genes for production. On the other hand, feeding goes along with it. We know from our studies that when the price of milk is high, our production records go up because the dairymen are feeding more grain. That shows the influence of feed on production.

The other point I want to mention is that the average production of all cows in dairy herd improvement associations is around 370 pounds of butterfat as compared with 210 pounds for the general average. There is no question in my mind but what we have to improve our cows through breeding and then develop the feeding to permit the cow to produce at full capacity.

Here is a little chart that shows all cows in the country, DHIA cows, and the daughters of the ABA bulls.

USE OF ARTIFICIAL BREEDING

Mr. ANDERSEN. Of course, this work becomes increasingly important as we depend more and more upon artificial insemination.

Dr. REED. That is right.

Mr. ANDERSEN. Because it greatly expands the influence of an individual bull.

Mr. HORAN. What are bull owners doing about this artificial insemination right now?

Dr. REED. I do not understand you.

Mr. HORAN. In certain areas, they have restrictions on the use of artificial insemination.

Dr. REED. There are some breed associations, not in the dairy industry as far as I know, where they will not allow artificial breeding to be done except on the farm where both the bull and the cows are

located. That is one of our beef cattle breeding associations, but there is no such inhibition otherwise with our dairy breeds.

The big influence that this whole proved sire program has had is that the breeders of registered cattle have not been able to sell as many bulls as they did formerly.

EFFECT ON FORMER BREEDING PRACTICES

Mr. HORAN. Bull owners have to live, too. I wonder how your artificial insemination is going to improve your male stock?

Dr. REED. We think it is going to improve it. If they will take more seriously this question of proved bulls, and prove bulls from their group of calves they will get more for one good proved bull than they formerly received for several nonproved bulls. These bulls are selling into the thousands of dollars if they are proved.

One very good breeder from your State, from Minnesota, tells me that since this artificial program has gone in, it has affected his sales to the point that he is only saving about 50 percent of his bulls for sale or for breeding purposes. He sees, that if 1 bull can breed 10,000 cows, and we have many of them that have bred more than 10,000 cows in a single year through artificial insemination, it means that we are going to eliminate a lot of low quality bulls in herds. You are going to eliminate bulls in the small herds because they are going to patronize artificial breeding. Heretofore a man with 10 to 15 cows felt he could not get along without a bull. He had to have something to breed his cows to. He would buy a bull at a price he could afford to pay.

DATA INCLUDED IN A PROVED-SIRE RECORD

Mr. HUNTER. I would like to know, Doctor, briefly, what data is included in the proved sire program records.

Dr. REED. It is data that we get from the herd improvement associations in the individual States. The testers fill out the forms and they are sent to the colleges. Then those records are sent in to Washington so all of our data comes from the States.

Mr. HUNTER. Are they concerned primarily with milk production?

Dr. REED. They are concerned with both milk and butterfat production.

Mr. HUNTER. Is there any method employed for adjusting the statistics for difference in feed conditions?

Dr. REED. Well, there is a school of thought that says mass records will iron out those differences. I think that a herd is a unit to itself and it is the individual herd and the individual heifers and cows, unselected, that we are using to prove bulls. The nearer you can have all environmental conditions controlled, say, on 1 herd or 1 unit, the better your data.

Mr. HUNTER. Do the forms include questions on feed conditions?

Dr. REED. Yes, they keep records on feed in their herd book but they lack accuracy.

Mr. HUNTER. Then your opinion is that there should be more data of that nature in order to make your overall records more accurate?

Dr. REED. That is right; that is why I mentioned trying this out in the field under strict experimentally controlled conditions to get a

line on just how we can put this program into operation so we will not have to use all records. We will just use a selected few, maybe 3 herds out of an association or two herds or maybe 10 herds. They would be marked herds, not cows, because the more you can control environmental conditions the better your records are.

Mr. HUNTER. Do you think it would be better to use the additional money requested or for that matter the money within your estimate, for this new type of work rather than garnering additional mass statistics?

Dr. REED. As I explained, we are planning to get real facts on this problem. I intended, and that has been our intention for some time, to use some of this money for research work. We have been back so far in our regular proving of the sires that we just have not had the money to do it, but if money is given us this year, we are going to use a certain amount for research work in several States to get at the facts so that in the future we can hold down this appropriation rather than continually increasing it, because there are more cows on test each year.

(Information requested showing data included in sire records is as follows:)

STATEMENT AS TO WHAT IS INCLUDED IN A PROVED-SIRE RECORD

A proved-sire record consists of at least five dam-daughter paired production records summarized to indicate the level of production the sire has transmitted to his daughters, comparing that production level with the production level of of the dams to which the sire was mated.

An example of how this bull proof is made available to the dairyman follows:

Sires	Animals	Records averaged	Milk	Test	Fat
Guernsey bull	6 daughters	9	10,046	4.4	441
Born (date); proved (date); sire, 312970; dam, 683724; owner, Minnesota.	6 dams	14	8,220	4.6	376
Difference		(5-3-4)	+1,826	−.2	+65

SUBSTITUTES FOR BUTTERFAT IN ICE CREAM PRODUCTION

Mr. HUNTER. To what extent have vegetable and animal fats replaced milk in the production of ice cream in this country? Are there any statistics available on that?

Dr. HOLM. No. We have tried to obtain statistics on that and we have been unable to; there are only four States in which the substitution of fats for butterfat in ice cream is allowed. We have been unable to get statistics from those four States.

COOPERATION WITH BREEDERS' ASSOCIATIONS AND LAND-GRANT COLLEGES

Mr. LAIRD. I would like to have something in the record about the cooperation between your bureau, the breeders' associations and the land-grant colleges. Is there duplication in this record-keeping field between the records that are kept out in the States and the records that you keep in your Bureau? Perhaps a statement could be inserted on this matter at this point.

(The information requested is as follows:)

STATEMENT CONCERNING THE STATE AGRICULTURAL COLLEGE EXTENSION SERVICES, THE BUREAU OF DAIRY INDUSTRY, USDA, AND DAIRY FARMERS IN THE SEVERAL STATES IN THE COOPERATIVE DHIA AND NATIONAL SIRE-PROVING PROGRAMS

The Extension Service dairy specialists in the States are responsible for and supervise the State program. This involves the formation of local dairy herd improvement associations in local counties and townships through the county agricultural agent. The farmer members form a cooperative association and elect officers to operate the local association, employ a tester to test their cows, and collect funds from the farmer-member to pay these costs. Each year dairy farmers participating in the DHIA program in the United States spend over $5 million of their own funds to pay the cost of the testing program on their farms. The production records and related information developed by the tester is useful to these dairymen in improving their breeding, feeding, management, and culling operations in their herds.

At the same time, information exists in the yearly production records produced in these association herds that is useful in identifying and selecting superior breeding stock that may be used to improve the producing ability of the Nation's dairy herd. Since the bull is the most important factor, the herd improvement emphasis has been placed on bull selection. The best way to select a superior bull is to choose one that has already demonstrated his ability to sire high-producing daughters. The surest way to bring about herd improvement is to locate such sires and use them in herds or in artificial breeding associations where their superior qualities can be extended over a large cow population.

The production records of cows in local DHIA associations are the source material of records for use in proving sires. Therefore, a cooperative program was developed whereby the tester of the local association sends properly identified production records of cows to the State extension dairyman's office. There the records are reviewed and forwarded to the Bureau for use in sire proving. The Bureau receives records in this way from all the States. In the Bureau the records received are processed to standardized conditions and as information becomes available in sufficient amounts to prove a sire, the proof is developed and recorded. Once each month a list of the sires proved in the Bureau from these data is published and made available to the State people. Thus, without duplicating effort and with the advantages of a coordinated, uniform program that cuts across State lines, information is developed and made available to the industry on the location and breeding value of dairy sires.

The several dairy cattle breed associations conduct for their membership herd testing and official testing programs for individual cows. These programs are confined to purebred breeders whereas the DHIA program includes purebred and grade dairymen. Close cooperation and coordination of the programs exist with the breed associations, most of whom send the herd test records produced in their program to the Bureau to be included in the national sire proving program. The DHIA and sire proving programs are sponsored by the American Diary Science Association which has several committees made up of dairy specialists from the States, the Bureau, and sometimes, of the various breed associations who prepare and recommend rules and procedures for the operation of these programs.

The number of records received for processing in this program has reached the point it is no longer possible for the Bureau of Dairy Industry to keep up with them without additional funds. The need for this information by the industry has not abated. It is realized that the program cannot be permitted to continually expand. Research is needed to determine how the needs of the dairy farmers might be met with a more selective, less expensive program.

COSTS OF MILK PRODUCTION

Mr. LAIRD. Dr. Reed, the cost of milk production in this country is considerably higher than the cost of foreign milk production. This of course, is due to the requirements for separate milk houses, sanitary production codes, TB programs, brucellosis programs, labor costs and so forth in this country. These various improvement programs have increased the cost of production of milk on the farm. The dairy farmer has a greater cost in the production of his milk because he has improved his product and has brought the sanitary standards under

which it is produced up to a high level. What consideration have you given to methods of cutting down the cost of production at the farm? What information have you developed on barn construction costs? What effect has that had on the production of milk?

Dr. REED. We have done some work at our field stations on running cattle loose in the barn and have some figures on that basis. The primary work that has been done on loose-housing and labor-saving devices that are put into the barn, has been done by the engineering department in the BPISAE and agricultural engineering departments at State stations. For instance, not on the average size farm but on the larger size farm, litter removal and the walk-through plan milking room and the open-shed program and, of course, the use of milking machines have been with us a long time.

Mr. LAIRD. Most of our milk production comes from small producers. The large producers can afford these new devices you speak of. What consideration are you giving to cutting down production costs? It takes a large investment to set yourself up in the dairy business whether you have 10 or 20 cows or more. After you are established in the dairy business you are faced with high production cost brought on by these improvement programs and regulations of the various milk markets on the production of milk. Understand I favor these many improvements but it has placed us in a noncompetitive position on the foreign market.

Dr. REED. In cooperation with the Bureau of Agricultural Economics we set up a contract with the Doane Agricultural Agency at St. Louis to work along those particular lines with the farmer. That work is just now being completed and reported. I was out there last fall and visited all the farms that are cooperating. An open shed pole barn was constructed with a little milk room. Milking was either by hand or machine. They are also cutting the costs of the silage program, and of building silos. The conventional type of silo for the little farmer is just out of the queston. The swing now is to trench silos and pit silos and to stacks. All these things are given consideration in this program and also the——

Mr. LAIRD. These have been talked about but do they actually reduce costs. Have you taken action to show these reductions?

Dr. REED. Sure, we are doing it. The whole question that we are working on, for the little farmer, is to cut his costs. We spend a lot of time in developing roughages and in feeding roughages and in developing our pastures, and so forth. This all cuts the cost because the cheapest feed is produced on good pastures. That cuts the cost of production. The study mentioned also embodies another objective. In the milk area we are trying to find out how we can produce clean milk without a lot of the very expensive equipment, including barns and other equipment around the dairy.

ECONOMIC PRODUCTION OF MILK

Mr. LAIRD. The reason I asked the question is this, that just a mile from where I live in Wisconsin, $60,000 is being spent on an experimental test. The University is building a new pole-type construction barn and they are trying to do it in an area where the temperature goes down as low as 40 below. They have never made any tests like this in a cold area. I wonder what use all this research

is if it does not get out to people. Foreign butter can be put down on the New York docks, the tariff paid, and it can still be sold for 45 cents per pound. I am for limiting these imports that are produced from milk which never was subjected to the same sanitary requirements. We find that 38 million pounds of dried whole milk powder was allowed to come into the United States in 1952 which is the equivalent of 304 million pounds of fluid milk. In this milk powder was 12 million pounds of butterfat.

Mr. REED. I can agree with you on that because I certainly think that we should not have dairy products come in that are produced under lower standards than those under which ours are produced. Of course, we have held out for that kind of a policy, but in studies of this question, we have gotten our shed-type barn, our stack silage, our pit silos, and the information is all available now. We have done and are doing a lot of work on pastures at Beltsville and other places. This is some of the most popular work that has been done for years because it has a direct bearing on the economic production of milk. We have done these things and have put out a lot of the information that I talked to you about yesterday; the processed information sheets. Sometimes we put out as many as 30,000 processed sheets annually. We cannot do all the work at the field stations we have or at Beltsville, which will be applicable in all sections. For instance, in the Far West or in the South or other places, work on shelters is being done that will we believe, cut down the cost of production. What you are doing in Wisconsin has also been duplicated in Pauling, N. Y. A couple of years ago they did a lot of work there. That work was done on the basis of producing milk in an open shed barn and trying to get the health authorities to allow the milk produced in that manner to come into New York City. In the past they have decried the open-shed method, of keeping animals, in relation to producing the best possible milk of the highest possible quality.

Mr. WHITTEN. I want to commend this bureau again for the very fine work it is doing in this field, particularly at this time. Though we have a little surplus butterfat in some areas of the country, certainly the need for milk has not been met in the least. The need for constantly improving the dairy herds and the other work that you are doing continues just as important as it ever has been.

RESEARCH BY INDUSTRY ON DAIRY PRODUCT UTILIZATION

Mr. ANDERSEN. I can agree absolutely with that.

Doctor, in relation to the $100,000 to increase utilization of dairy products, to what extent are private organizations doing research in this general field?

Dr. REED. Dr. Holm, you can answer that question.

Dr. HOLM. There are a few who are large enough to carry on work in this field, along their own special lines. If we survey their programs we find they are usually limited largely to products in which they are directly interested and also to what might be called trouble shooting, that is, problems peculiar to their own trade. I think the experiment stations and the Federal Government are the only agencies which carry on research on a longtime basis, on problems that are fundamental to the development of the industry.

DEVELOPMENT OF BETTER METHODS FOR MAKING DIFFERENT TYPES OF CHEESE

Mr. ANDERSEN. Doctor, you might describe in some detail the work you do on production of cheese and packaging of dried milk and cheese.

Dr. HOLM. As far as packaging work is concerned, we have done very little. We have never had the funds to go into it to the extent that we should. It involves not only the study of packages; it involves the studies of methods of making the cheese suitable for packaging.

We are interested in foreign-type cheese because under normal conditions we import around 60 million pounds of cheese annually.

Mr. ANDERSEN. When you say you are interested in foreign cheeses that means you are interested in trying to develop types of cheese which will compete with foreign cheese?

Dr. HOLM. No.

Mr. ANDERSEN. What do you mean?

Dr. HOLM. First, I might say that all the cheeses with one exception are of foreign types; only one cheese has ever been developed in this country and that is Liederkranz. We are interested in making cheese of good quality. We feel we have the milk and should make them under good, sanitary, wholesome conditions. Now, they are not all of good quality. As you know, Cheddar, Swiss, Blue, and so forth, are not of a quality we think they should be. We have also been interested in making these types of cheese from pasteurized milk. They used to be and some still are made from raw milk. I think we were the first, you might say, who practically insisted that all cheese should be made from pasteurized milk. This means that we have to go back as it were, and, change our method slightly or discover new methods. We have done it with Cheddar cheese and we have come quite far along the line of doing it for Swiss.

We have done considerable work on Swiss and we have done considerable work on Blue cheese and lately we have gone into the question of making these and other cheeses more economically. This is the development which was mentioned yesterday. We are making Cheddar cheese in one-half or less than one-half the time it usually takes to make it, which means we cut the costs of the making process. We are interested in extending this development since we feel that the fundamental factor concerned can be applied to the making of all types of cheese. We have also been interested in utilization of whey. We feel there is much good food material in whey which should be utilized in some form. We have some cooperative work. A small amount of money has been allotted to the experiment station in Ohio to do some fundamental work on Italian types of cheese which are growing in demand in this country. We are only interested in the fundamentals concerned. The application is a problem of the industry.

We have another cooperative project in Wisconsin which we have just completed, on making brick cheese. They had 10 years' experience in that field and we felt it would have been a waste of money for us to start from scratch so we allotted a small amount of money to Wisconsin to finish the job. They just finished it last year. Now they are on another cooperative project concerned with feeding of silage and utilization of that milk for the production of Swiss cheese.

CHEESE STANDARDS IMPOSED BY THE FOOD AND DRUG ADMINISTRATION

Mr. HORAN. I might add this. What is the purity factor in cheese?

Dr. HOLM. You mean the wholesomeness?

Mr. HORAN. The sanitary considerations?

Dr. HOLM. First of all, you might say the raw milk. We have always felt that cheese should be made from pasteurized milk.

Mr. HORAN. Is all cheese imported into this country made from pasteurized milk?

Dr. HOLM. No, not in all cases.

Mr. HORAN. What, then, is the purity factor that the Food and Drug Administration might be interested in?

Dr. HOLM. This administration brought the Italian cheese problem to our attention. We entered the work through their influence, you might say. You know in making Italian cheese the manufacturers use what is called rennet paste.

Mr. HORAN. What are the standards that the Food and Drug Administration uses to determine the purity of cheese for human consumption?

Dr. HOLM. May I go on and finish? Since this rennet paste is not a very pleasing product, the Food and Drug Administration felt that they could not allow its use in the making of these Italian types of cheese domestically, and as I understand, they drew the line on its use. Then the question arose, can we make these Italian types of cheese without this paste? The Italian cheesemakers maintain that it could not be done. Our problem was to find out if rennet extract of certain types could be used successfully. Can they be used, and can the flavor be obtained which seemed to be desired by so many people. That is how this project was set up at the Ohio Experiment Station at Columbus, Ohio, to find out if we could make these types of cheese without rennet paste. I cannot tell you just how Food and Drug administers these regulations. One of the tests they use is the sediment test, that is, extraneous matter in cheese, to determine if the cheese contains fly wings, fly abdomens, dirt, rodent hairs, or other extraneous matter. It is one of the tests they employ.

Mr. HORAN. I do not like to see a double standard.

Mr. ANDERSEN. I do not, either. As the gentleman from Wisconsin pointed out, American manufacturers are required to meet high standards to provide a product for the American consumer that is beyond question as to purity. Yet our Government permits the importation of products not manufactured under our strict regulations which appear to have a superior demand on the local markets to that which we produce under the handicap of being an American producer.

Dr. HOLM. I think in all fairness to the Food and Drug Administration, we should call attention to their vigilance. In a bulletin, issued regularly by this agency, are listed accounts of many seizures of cheese and other products that have been made because of the presence of extraneous matter in the products concerned.

PARTICIPATION BY INDUSTRY IN PACKAGING AND CHEESEMAKING RESEARCH

Mr. ANDERSEN. To what extent is the cheese industry doing research on the production of cheese and packaging of dried milk and cheese?

Dr. REED. The work on the packaging of cheese is an application of research on the manufacture of cheese and on plastic wrapping materials. Practically all of this work has been done by members of the industry and by manufacturers of plastics. However, it should be pointed out here that the work which initiated this development in application was the basic work done in the Bureau on making Cheddar cheese from pasteurized milk and that done on the curing of cheese curd in cans of consumer size. The recent developments in the packaging of cheese are but modifications of this earlier work, in the interest of greater economy and other sales factors.

Similarly, with the packaging of dried milks, industry, in cooperation with container manufacturers, has done most of the application work in this field. However, the basic work on the products and the establishment of the requirements for packages from the standpoint of products' characteristics, was the work of Federal and State agencies. In the production of cheese, the industry is doing considerable work in application, but the basic work relating to handling, use, and characteristic fermentations of various bacterial cultures and molds, and their relation to quality, as well as the work on reliable tests for quality and for constituents, is done mainly by Federal and State agencies.

Mr. ANDERSEN. Have these organizations come to depend on the Government for all new developments in these fields?

Dr. REED. In the work of application, the industry does not depend upon the Bureau, and cannot, since the work of the Bureau is limited, as far as possible, to the solution of fundamental problems related to the various products. The industry does depend to a considerable extent upon Federal agencies, State experiment stations, and industrial and other laboratories for their basic information.

Mr. ANDERSEN. Is this not bad for the dairy industry in the long run?

Dr. REED. Every industry, and especially agriculture, depends to some extent upon the agencies indicated for basic information—some more than others. The dairy industry is made up of 3,648,000 producers, several thousand small processors, and a relatively few large processors. It is evident that but a small part of the dairy industry is in a position to develop the basic information the industry needs for its regulation and sound development. The interests of the consumer must also be considered. The basic information is necessary in the work of all Federal and State health and regulatory agencies to assure to the consumer standard and wholesome products.

The producers, processors, consumers, and all regulatory agencies must have this basic information as a cornerstone to support the dairy industry's progress.

Mr. ANDERSEN. Does it not tend to dull individual initiative which is important under our competitive system?

Dr. REED. No. There can be no competition in the consideration of health and regulatory measures. These measures are necessary, and fundamental information is necessary to their formulation and application. So far as the processors are concerned, most of them are not in a position to obtain this information themselves and are at a disadvantage. The competition in the dairy industry is largely in application. The producer and consumer must rely largely upon some public agency for their information.

Development of basic knowledge for general use does not greatly affect individual competition. It does tend to assure an orderly and sound development of all the units of a widely distributed industry.

PROGRESS IN HYBRID COW DEVELOPMENT

Mr. ANDERSEN. What has been the progress on hybrid cow development?

Dr. REED. The progress which has been made at Beltsville in the study of crossbreeding of dairy cattle is best shown in the form of a generation-by-generation summary of milk and butterfat production of animals produced on this experiment. I have a summary which is complete for the first three groups, but more records will be added in the fourth group as cows complete their production tests.

(The summary referred to is as follows:)

Average milk and butterfat production records completed by animals in the various generations on the crossbreeding experiment at Beltsville, Md.

Generation	Actual production records					Mature equivalent	
	Number	Milk	Percent	Fat	Age	Milk	Fat
Foundation cows	55	10,540	4.55	455	2-6	13,799	594
2-breed crosses	55	13,039	4.53	586	2-2	17,811	799
3-breed crosses	58	13,361	4.44	588	2-2	18,240	801
Progeny of 3-breed crosses	23	13,174	4.58	600	2-3	17,764	800

The above records were made on 3 milkings daily for 365 days.

PROGRESS IN COW BREEDING

Mr. ANDERSEN. What has been the progress on cow breeding?

Dr. REED. Dairy cattle breeding research work at Beltsville and the Bureau's branch stations has resulted in the development of the proved-sire method for improving producing ability in dairy cattle. This method has been largely adopted by artificial-breeding associations, and has been most effective in selling artificial breeding to large numbers of dairymen. To indicate the recently awakened interest in breeding better cattle, funds allotted to this Bureau through the Research and Marketing Act made it possible to help plan and organize two regional dairy cattle breeding projects in cooperation with State experiment stations in the north-central region and in the southern region. These cooperative studies represent the first organized effort to coordinate and expand constructive research work in this field, where many of the stations felt that they lacked funds and facilities to attack breeding problems alone, but could make substantial contributions when working cooperatively with a larger group of agencies. This has enabled the specialists of this Bureau to work directly in planning and organizing dairy cattle breeding work on a sound basis, and it is the first organized effort to make dairy cattle breeding research more fruitful.

ADMINISTRATION AND ENFORCEMENT OF PROCESS BUTTER ACT

Mr. ANDERSEN. I would like to have a short discussion relative to the administration and enforcement of the Process Butter Act.

Dr. REED. The Process Butter Act is contained in section 2325 of the Internal Revenue Code, as revised June 24, 1946 (63 Stat. 300). Briefly, the purpose of this act is to protect interstate and foreign commerce from process or renovated butter which is unclean, unwholesome, unhealthful, or otherwise unfit for human food.

The Secretary of Agriculture has, through authority contained in the act, designated the Chief of the Bureau of Dairy Industry as his agent in accomplishing the purposes of the act.

At the present time a single company is making process or renovated butter. This company, the Southern Butter Co., has a butter-oil plant at Cullman, Ala., and a process or renovated butter manufacturing plant at Birmingham, Ala. Farm butter is received at Cullman where it is melted. This refined product is shipped to Birmingham where the process or renovated butter is made. The Bureau conducts continuous inspection on all phases of the manufacture and the wrapping and packaging of the product. During the calendar year 1952 approximately 1,000,000 pounds of process or renovated butter were manufactured. This program requires the employment of three inspectors.

RECEIPTS AND EXPENDITURES COMPARED

Mr. ANDERSEN. I would like a comparison of the receipts and expenditures in your organization placed in the record at this point.

(The information requested is as follows:)

Statement of receipts and obligations for years 1949–53

	Receipts from sales of dairy products and animals	Obligations
1949	$128,328	$1,508,355
1950	109,862	1,637,987
1951	149,730	1,592,773
1952	134,337	1,580,179
1953 (estimate)	126,000	1,590,055

WORK PERFORMED BY TRANSFER

Mr. ANDERSEN. What work do you perform under transfer from the AMA appropriation?

Dr. REED. The Bureau is performing two lines of work under transfer from the AMA appropriation. The first of these is to develop improved United States standards for hay to reflect the feeding value.

The second is to determine what the yield of dairy products from a given unit quantity of milk might be under normal commercial operations.

FUNCTION OF INFORMATION DIVISION

Mr. ANDERSEN. What is the work of your information division in which I understand you have three people.

(The information requested is as follows:)

STATEMENT CONCERNING THE WORK OF THE INFORMATION DIVISION

There are three people in the Bureau's Information Division—i. e., the head of the Division, an editor, and a printing and publication clerk—all of whom answer requests for information about a variety of dairy subjects (whether or not the

subject is in the Bureau's field). Requests for dairy information are by phone, by personal visit, by letter, etc., from people in the Bureau, people in the Department of Agriculture, people in other Government agencies, Members of Congress, and the public.

In addition to handling requests for information, the head of the Division and the editor together edit and prepare manuscripts for publication as technical bulletins, circulars, multilith d pamphlets, and farmers' bulletins; the head of the Division writes the Bureau's annual report and sees that it is published on time, writes an occasional press release reporting some new research accomplishment, and serves on the Bureau's research project committee to review all new projects and assist in the preparation of the annual report of progress by projects.

At present there are eight manuscripts in the Information Division in various stages of editorial preparation, on which time can be spent only intermittently as other more urgent tasks permit.

The printing and publication clerk spends only about half her time on duties related to information work, such as distributing publications, maintaining mailing lists, handling photographic files, and maintaining a supply of publications for use in answering requests. More than 500 separate pieces of literature prepared by BDI research workers are listed for distribution to the public, and considerable time is required to keep them in stock and to distribute them when called for. The other half of her time is spent on so-called noninformation or service work for the Bureau as a whole, such as handling job printing and duplicated forms required in conducting Bureau work, procuring research photographic prints, and providing estimates of all printing costs.

ADMINISTRATIVE FUNCTIONS

Mr. ANDERSEN. What functions do the 26 people in your administrative unit perform?

(The information requested is as follows:)

STATEMENT OF FUNCTIONS OF ADMINISTRATIVE UNIT

(a) Office of Assistant Chief: Analyzes, formulates, and effectuates administrative policies and methods throughout the Bureau structure in order to facilitate and effectuate the orderly conduct of the research work of the Bureau and to provide procedures designed to effect compliance with the laws, regulations, and policies pertaining to the business activities of the Bureau; directs the Bureau's regulatory program; and represents the Bureau in all matters of administrative management, Assistant Chief and secretary	2
(b) Finance and Business Services Division:	
Prepares and assists in presenting budgetary estimates to the Department, Budget Bureau, and Congress; exercises expenditure controls through apportionment and allocation of available funds, and control over revenues; plans and directs the preparation of all regular and special budgetary and fiscal reports	4
Conducts procurement and sales activities and maintains property accountability records	*4
Maintains leave and retirement records; prepares payrolls; performs various audit functions	*4
Maintains an adequate mail and records section, including messenger service; prepares statistical reports; maintains administrative issuances, contracts, cooperative agreements, and patent work	6
(c) Personnel Division: Conducts the personnel functions of the Bureau, including position classification and placement of personnel; conducts safety and training programs; provides an employee counseling service; supervises the application of the Department performance-rating program and the preparation of functional and organizational charts	3
(d) Engineering Section: Designs, constructs, and develops scientific apparatus; conducts tests of laboratory equipment; supervises construction; maintains laboratory equipment; and acts in advisory capacity to Division heads and others in matters involving technical engineering problems	3
Total	26

* It is planned to drop one position in each of these activities.

PRODUCTION OF FILMS AND MOTION PICTURES

Mr. ANDERSEN. Doctor, what work do you do on films and motion pictures?

Dr. REED. We have done no work on motion pictures in recent years except in an advisory capacity to the Department's Motion Pictures Service on dairy subject matter.

INVENTORY OF OFFICE MACHINES

Mr. ANDERSEN. What IBM or other similar machines do you have? Describe them, the number of machines of each type and the cost.

(The information requested is as follows:)

Statement of mechanical office equipment and business machines in rental status as of Dec. 31, 1952

Type of machine	Number of each type of machine	Company owning machine	Annual rental rate
Automatic feed, model FE-1	1	Recordak	$36.00
Film readers, model 10	3	do	180.00
Accounting machine, type 405	1	IBM	4,950.00
Cardatype, type 856	1	do	1,518.00
Collator, type 77	2	do	2,112.00
Interpreter, type 552	1	do	990.00
Punch, reproducing, type 513	1	do	1,320.00
Punch, electric calculating, type 604	1	do	7,524.00
Punch, card, type 24	4	do	1,848.00
Punch, alphabetical, type 31	1	do	330.00
Punch, duplicating, type 16	1	do	237.60
Sorter, type 080	1	do	528.00
Sorter, type 082	1	do	792.00
Verifier, type 056	3	do	1,782.00
Total	22		24,147.60

Brief explanation of general program purposes: This office equipment is used in compiling proved-sire records in connection with the national dairy herd improvement program.

OPERATING AUTHORITY

Mr. ANDERSEN. Insert in the record your basic authority for each project and indicate whether each is mandatory or permissive under law.

(The information requested is as follows:)

STATEMENT CONCERNING THE BASIC AUTHORITY FOR THE WORK PERFORMED BY THE BUREAU OF DAIRY INDUSTRY

Public Law No. 156, 68th Congress, established a Dairy Bureau in the Department of Agriculture. This act indicates that a Chief of the Bureau shall be appointed by the Secretary of Agriculture who shall be subject to the general direction of the Secretary of Agriculture, and further that "He shall devote his time to the investigation of the dairy industry and the dissemination of information for the promotion of the diary industry." This act became effective July 1, 1924. All projects currently being performed within the Bureau, with the exception of the process butter work, come within the purview of this act.

The process butter law is contained in section 2325 of the Internal Revenue Code, approved June 24, 1946 (60 Stat. 300). This law establishes a mandatory requirement that the Secretary of Agriculture protect interstate and foreign commerce from process or renovated butter which is unclean, unwholesome, unhealthful, or otherwise unfit for human food.

Mr. ANDERSEN. Gentlemen, are there any general questions?

COMPILING PROVED-SIRE RECORDS

Mr. HUNTER. I fail to see where keeping a record in Washington of every bull in the United States is the best and cheapest way of increasing milk production. It would seem to me that it would be better to apply the sampling method and be more selective. If I understand correctly, the present program can eventually result in a record being kept on every bull in the United States, and each year it becomes more costly to keep these records as the number of bulls and cows increases. As you mentioned earlier, Dr. Reed, what you plan to do is pick out several areas in the United States and keep more accurate statistics on the amount and type of feed, and that information to be disseminated throughout the United States to various dairy-herd-improvement associations with the result that milk production will increase.

Dr. REED. What we are attempting to do in the experiment that I spoke of is to select these various herds, and that is where the real proved bulls will come from. We will eliminate a lot of these animals that are listed in our file and on which we will never get proof; but as long as we have had the cooperative program we have accepted all of the records. One bull may produce two daughters. We put him in the record thinking that next year he will produce 2 more daughters or even 8 or 10, but this may never materialize. We may never get more records on that animal. In the case of old bulls we may eventually receive enough records for their proof. But, if they die, nobody ever tells us anything about it.

Mr. HUNTER. It looks to me like a great deal of information is being run through the Department's IBM machines to no avail.

Dr. REED. That is what I tried to explain, that we are trying to do right now, eliminating a lot of the material that comes in. That is exactly what we want to do, and we are thinking about it and studying it. We have not had the right sort of setup with our State extension forces with which we cooperate. We have never had agreement where we sit around the table and talk the thing over. Now we have this agreement, approved by our own department and approved by the committee from representative States all over the country who met here last month. The plan is ready to go into effect on the 1st of July. But, before we get it into operation, we must have it approved by every State individually.

Mr. ANDERSEN. Doctor, I think we have had a very worth-while discussion. We could discuss your operations for 3 or 4 days with profit, because it is interesting to all of the members of the committee; but we must adjourn at this point.

I do want you to know that we appreciate the full information which you gentlemen have given us on this very vital subject.

Dr. REED. Thank you, Mr. Chairman.

MONDAY, MARCH 16, 1953.

BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

WITNESSES

DR. G. E. HILBERT, CHIEF, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
HENRY A. DONOVAN, ASSISTANT CHIEF, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
DR. GEORGE W. IRVING, JR., ASSISTANT CHIEF, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
DR. WALTER M. SCOTT, ASSISTANT CHIEF, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
DR. JOHN R. MATCHETT, ASSISTANT CHIEF, BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY
DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION
JOSEPH C. WHEELER, DEPUTY DIRECTOR, OFFICE OF BUDGET AND FINANCE, DEPARTMENT OF AGRICULTURE

SALARIES AND EXPENSES

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$7,675,000	$7,499,522	$8,000,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," pursuant to 5 U. S. C. 568b	−7,000		
Adjusted appropriation or estimate	7,668,000	7,499,522	8,000,000
Reimbursements from non-Federal sources	1,329	1,600	1,600
Reimbursements from other accounts	21,428	18,041	
Total available for obligation	7,690,757	7,519,163	8,001,600
Unobligated balance, estimated savings	−132,197		
Obligations incurred	7,558,560	7,519,163	8,001,600

NOTE.—Reimbursements from non-Federal sources above are from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Cereal and forage crop utilization investigations	$1,220,843	$1,137,893	$1,178,021
2. Cotton and other fiber utilization investigations	1,168,214	1,167,559	1,267,569
3. Fruit and vegetable utilization investigations	1,964,794	1,958,039	2,138,389
4. Oilseed utilization investigations	1,062,994	1,043,786	1,043,786
5. Sugar and special plants utilization investigations	817,820	934,984	934,984
6. Poultry, dairy, and animal products utilization investigations	1,038,154	1,016,284	1,096,284
7. Agricultural residues utilization investigations	242,984	240,977	240,977
8. Obligations under reimbursements from non-Federal sources	1,329	1,600	1,600
Total direct obligations	7,537,132	7,501,122	8,001,600

Obligations by activities—Continued

Description	1952 actual	1953 estimate	1954 estimate
Obligations Payable Out of Reimbursements From Other Accounts			
1. Cereal and forage crop utilization investigations	$946	$3,604	
2. Cotton and other fiber utilization investigations	184	4,020	
3. Fruit and vegetable utilization investigations	4,854	5,235	
4. Oilseed utilization investigations	6,511	1,707	
5. Sugar and special plants utilization investigations	1,531	1,200	
6. Poultry, dairy, and animal products utilization investigations	2,271	1,300	
7. Agricultural residues utilization investigations	5,131	975	
Total obligations payable out of reimbursements from other accounts	21,428	18,041	
Obligations incurred	7,558,560	7,519,163	8,001,600

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	1,350	1,273	1,308
Full time equivalent of all other positions	18	11	11
Average number of all employees	1,264	1,228	1,278
Average salaries and grades:			
General schedule grades:			
Average salary	$5,065	$5,169	$5,190
Average grade	GS-7.5	GS-7.6	GS-7.6
Crafts, protective, and custodial grades:			
Average salary	$3,179	$3,238	$3,264
Average grade	CPC-4.2	CPC-4.2	CPC-4.2
Personal service obligations:			
Permanent positions	$5,929,784	$5,887,622	$6,194,219
Part time and temporary positions	59,080	35,081	33,001
Regular pay in excess of 52 week base	22,242	22,876	24,619
Payment above basic rates	14,095	14,050	14,050
Total personal service obligations	6,025,201	5,959,629	6,265,889
Direct Obligations			
01 Personal services	6,004,093	5,941,588	6,265,889
02 Travel	108,716	131,100	140,600
03 Transportation of things	24,337	24,500	27,700
04 Communication services	40,393	43,700	46,700
05 Rents and utility services	160,493	158,500	160,100
06 Printing and reproduction	20,758	27,000	27,100
07 Other contractual services	542,940	516,650	605,500
Services performed by other agencies	12,566	10,500	10,500
08 Supplies and materials	415,186	450,189	479,700
09 Equipment	196,038	180,875	218,300
10 Lands and structures	7,139	10,500	10,000
13 Refunds, awards, and indemnities: Awards for employee suggestions	265		
15 Taxes and assessments	4,532	6,500	9,991
Subtotal	7,537,456	7,501,602	8,002,080
Deduct charges for quarters and subsistence	324	480	480
Total direct obligations	7,537,132	7,501,122	8,001,600
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	21,108	18,041	
04 Communication services	35		
05 Rents and utility services	25		
07 Other contractual services	10		
08 Supplies and materials	250		
Total obligations payable out of reimbursements from other accounts	21,428	18,041	
Obligations incurred	7,558,560	7,519,163	8,001,600

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$1,335,422	$1,507,119	$1,544,541
Obligations incurred during the year	7,558,560	7,519,163	8,001,600
	8,893,982	9,026,282	9,546,141
Deduct:			
Reimbursable obligations	22,757	19,641	1,600
Unliquidated obligations, end of year	1,507,119	1,544,541	1,699,241
Adjustment in obligations of prior years	9,117		
Obligated balance carried to certified claims account	4,729		
Total expenditures	7,350,260	7,462,100	7,845,300
Expenditures are distributed as follows:			
Out of current authorizations	6,434,233	6,532,500	6,867,400
Out of prior authorizations	916,027	929,600	977,900

Mr. HORAN. The committee will come to order.

We have with us this morning the Bureau of Agricultural and Industrial Chemistry, and we have Dr. M. R. Clarkson and Dr. G. E. Hilbert, with us.

We will insert in the record at this point pages 206, 207, 212 through 225 of the justifications.

(The pages referred to follow:)

BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

PURPOSE STATEMENT

The Bureau of Agricultural and Industrial Chemistry as now constituted was established in 1943, continuing research work conducted for many years by predecessor organizations. A Bureau of Chemistry existed in 1901 and the Congress had appropriated funds for chemical analyses of agricultural products as early as 1848.

The Bureau conducts research in the field of chemistry and related physical sciences on utilization of agricultural commodities, residues, and byproducts in the creation of improved foods, feeds, drugs, fabrics, industrial chemicals, and other nonedible products.

Four regional research laboratories, one in each of the major farm producing areas, provide facilities for investigations to develop new and expanded industrial and food uses for the principal farm commodities of their respective regions:

Southern Laboratory, New Orleans, La.: Cotton, rice, peanuts and other oilseeds, sugar, and sweetpotatoes.

Western Laboratory, Albany, Calif.: Fruits, vegetables, poultry products, alfalfa, wheat, rice, sugar, and wool.

Eastern Laboratory, Wyndmoor, Pa.: Vegetables, tobacco, fruits, uncultivated plants, milk products, animal skins, hides and tanning materials, animal fats and oils, honey, and maple sugar.

Northern Laboratory, Peoria, Ill.: Corn, wheat, and other cereals, such as oats, rye, and barley, soybeans and other oilseeds, sugar, and agricultural residues.

This decentralized operation also facilitates contact with food processors and other industry groups. In nine smaller field stations of the Bureau applied research is being directed toward the problems of processing and utilizing the products and byproducts of pine gum, tung nuts, sugar plants, citrus and other fruits, and vegetables. Fundamental research is conducted on the nature and control of enzyme action, on toxic and other physiological effects of substances that might be considered for medicinal uses or that contaminate or exist in foods and feeds, and on substances that exhibit special biological activity in or toward plants.

Employment as of November 30, 1952, was 1,196 of which 54 were in the headquarters office in Washington, and the balance in the field.

Appropriated funds:	
Appropriated, 1953	$7,499,522
Budget estimate, 1954	8,000,000

Salaries and expenses

Appropriation Act, 1953	$7,500,000
Reduction pursuant to sec. 411	−478
Adjusted appropriation, 1953, and base for 1954	7,499,522
Budget estimate, 1954	8,000,000
Increase	+500,478

Summary of increases, 1954

For research on food and feed preservation to promote maximum efficient utilization to meet expanding population needs	+$300,478
For research to obtain new information to extend and improve utilization of cotton and wool fibers	+200,000

Project statement

Project	1952	1953 estimate	Increases	1954 estimate
1. Cereal- and forage-crop utilization investigations	$1,220,843	$1,137,893	+$40,128	$1,178,021
2. Cotton and other fiber utilization investigations	1,16[illegible],214	1,167,559	+200,000	1,367,559
3. Fruit and vegetable utilization investigations	1,984,794	1,958,039	+180,350	2,138,389
4. Oilseed utilization investigations	1,062,994	1,043,786		1,043,786
5. Sugar and special plants utilization investigations	817,820	934,984		934,984
6. Poultry, dairy, and animal products utilization investigations	1,038,154	1,016,284	+80,000	1,096,284
7. Agricultural residues utilization investigations	242,984	240,977		240,977
Unobligated balance	132,197			
Total available or estimate	7,66[illegible],000	7,499,522	+500,478	8,000,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration"	+7,000			
Reduction pursuant to sec. 411		+478		
Total appropriation or estimate	7,675,000	7,500,000		

STATUS OF PROGRAM

Current activities

The Bureau is cooperating actively with the Department of Defense, State Agricultural Experiment Stations, farm cooperative groups and industrial concerns in prosecuting vigorously research designed to provide increased and improved outlets for agricultural commodities, thereby improving the farmers' economic situation. The investigations are chosen with careful consideration for the solution of urgent agricultural problems, for example, to find improved practical expanded outlets for such commodities as animal fats and others in current surplus. The immediate objectives of these investigations also take account of the military requirement for products prepared from agricultural commodities in accord with their needs.

Among the research activities of especial importance are: (*a*) Those designed to provide concentrated foods of enhanced quality, convenience in preparation for the table, and logistic economy; (*b*) Those designed to provide cotton and wool fabrics of improved properties important in peacetime markets, as well as flameproofed fabrics indispensable in modern warfare; (*c*) Those designed to provide products important to the physical well-being of military personnel, as well as civilians, in time of emergency, for instance, dextran, a substitute for plasma; (*d*) those designed to make available from agricultural sources such necessary industrial products as global grease, a lubricant unaffected by extremes of temperature.

Selected examples of recent progress

1. *Antioxidant for preserving carotene in alfalfa.*—Dehydrated alfalfa is extensively used in mixed feeds to supply provitamin A (carotene). The carotene is rapidly destroyed during storage, thus decreasing the value of the meal produced each year by several million dollars. An antioxidant has been discovered which effectively preserves the carotene. Successful full-scale commercial trials at 2

plants for 2 seasons indicate that the method of application is simple and the costs nominal. Extensive toxicity studies on the antioxidant are well advanced and appear favorable. The Bureau of Field Crops, California Department of Agriculture, has granted tentative approval for the use of this antioxidant on alfalfa at a level of 0.015 percent and 1 large alfalfa dehydrator in California is currently so treating its total production at 2 plants.

2. *Canned white rice product developed.*—Widespread use of rice in the diet of the American family is restricted partly because of the time-consuming method necessary for its preparation. A satisfactory canned white rice has been developed which has the desirable qualities of whiteness, flavor, and texture of well-cooked fresh white rice. Preparation for serving requires only that the canned rice be heated in boiling water for 1 minute. The process avoids previously encountered manufacturing difficulties, particularly formation of pasty kernels. It is applicable to both long- and short-grain rice; its storage life is good; and it offers the possibility of developing new specialty canned food items such as chicken and rice or spanish rice.

3. *New information obtained on the deterioration of foods and feeds by chemical browning.*—A comprehensive general theory has been developed to explain the chemistry of the interaction between proteins and sugars in concentrated foods and feeds. Serious losses in quality and nutritive value have occurred from this cause which is commonly called the browning reaction. The new theory has resulted from studies of the reactions between dextrose sugar and amines in which new reactions and compounds were discovered. The new theory points the way for research on the control and prevention of losses which result from chemical browning in dried fruits, dry milk, and other concentrated foods and feeds.

4. *Research on dextran establishes production of this important blood plasma extender.*—All domestic producers of dextran blood plasma extender use the bacterium discovered by the Bureau. The Armed Services Medical Procurement Agency has placed orders for dextran totaling over $25,000,000. Further orders are awaiting the completion of additional production capacity. Early industrial production of dextran for national defense is a result of the direct communication of the results of the Bureau's research to private industries, the National Research Council, and medical research workers. This research has been of immediate practical value because it covered all the important phases involved, including a survey of dextran-producing bacteria, chemical and physical characterizations, enzyme and culture methods of production, degradation to clinical size, and pilot-plant-production studies. Current work is directed toward achievement of important economies in manufacture and improvement of quality.

5. *Alcohol-water injection tested in farm tractors.*—Farm tractor tests with alcohol-water injection to boost the octane number of tractor fuels were carried out with 50 tractors on Ohio farms. No difficulties attributable to alcohol-water injection were encountered. Twelve of the fifteen cooperating farmers using high-compression engines (which require fuels of higher octane number than presently produced) planned to continue using alcohol-water injection after the test was completed because of the fuel economy and extra power obtained. On the basis of these tests, a large tractor manufacturer is engaged in making a high-compression tractor for use with alcohol-water injection for more efficient farm operation.

6. *Premium-quality wax obtained from rice bran.*—When freshly extracted rice-bran oil is allowed to stand, a sludge settles out. In research aimed at finding uses for this material, a hard, high-melting, nontacky wax was obtained by relatively simple procedures. The wax is not quite so high melting nor hard as carnauba—the hardest wax known—but its physical properties are good, and it should have commercial value approaching that of carnauba wax, which normally sells for more than a dollar a pound. If all the domestic rice bran were extracted an estimated 50 million pounds of oil would be produced, from which almost 1 million pounds of wax could be recovered. Commercial and defense organizations are evaluating the wax for specific applications.

7. *Improved creaseproofed cotton fabric.*—A promising creaseproofed cotton developed in the Bureau is being evaluated by commercial firms. It is made by a two-step process. First, the cotton cellulose is modified molecularly by treatment with a low-cost organic acid to give carboxymethylated cotton containing a mildly acidic group. The presence of the acidic group permits an improvement in the application of the creaseproofing resin and gives a cloth superior in both wrinkle resistance and strength to that treated in the usual manner. The built-in acid group avoids damage caused by the strong acid salts which must be added in conventional processes to set the creaseproofing resin. Although several processes

are used commercially to impart crease resistance to cotton cloth, much better methods are needed to improve cotton's position. More than 2 million bales are now consumed annually in clothing and household fabrics, in which crease resistance is a desirable property.

8. *New techniques in cotton processing improve quality, raise production, reduce waste.*—New techniques for improved control of neps—tangled knots of cotton fibers that lower quality—were mentioned in last year's report. The final report of this processing study upset some 150-year-old concepts in the cotton industry and showed that newly recommended speeds and settings for carding machines not only reduce neps but also reduce waste, raise production, and produce yarns of higher strength and better quality. Better fiber handling—the key to lowered nep formation—results largely from maintaining good machine conditions, beating fibers less, and coordinating surface speeds of moving card parts. Application of the information obtained in the study is reported to be saving 1 mill about $680 per card per year through higher production and lower waste. For an average mill, engaged in the manufacture of coarse yarns, the annual saving would be about $170,000.

9. *Improved instrument to test cotton fibers developed.*—An improved instrument for measuring the tensile strength and elongation of small tufts of cotton fibers has been developed by the Bureau. The name given to the instrument, the "Stelometer," was taken from strength elongation, and meter. Its advantages, compared with previous testers, include its ability to measure both strength and elongation-at-break of the fibers and to provide results at greater accuracy and speed. Since the elastic property of single fibers is an important factor in the ability of fabrics to stand hard wear, the new tester should prove extremely useful to mills and cotton merchants in selecting cottons for end-uses where durability is desired, and to breeders in developing new strains possessing improved elastic properties.

10. *New conforming bandage now produced commercially.*—A new type of cotton bandage developed in the Bureau during World War II is now being made commercially for the Armed Forces and may soon be available for civilian use. The outstanding feature of this new bandage is its elastic property resulting in ready adaptability to irregular contours of the body. In recent tests in Army hospitals and field stations in Korea the conforming bandage performed better than any other types for securing newly developed special dressings to multiple wounds and large burned areas. The new bandage costs less than one-half that of the conforming types of bandage previously used, and as a result of these successful evaluations the Office of the Surgeon General requested manufacturers to undertake commercial production. At present two firms are in limited production.

11. *Merit of cotton opener told by industry.*—The reports for the last 2 years described the development and introduction of a new type of machine for opening and fluffing cotton in textile mills. During the past year additional openers have been installed and the merit of the machine proved under different industrial conditions. One mill official publicly reported that use of the opener improved yarn quality and at the same time saved his firm $2 per bale of cotton processed, or $80,000 annually. Another mill reported that the opener paid for itself in less than 10 weeks—a saving of almost $1,000 per week. The potential value of the opener can be estimated from the 1951 crop of 15.3 million bales, of which almost one-half graded Strict Low Middling, or lower. If all of this low-grade cotton had been processed through the opener with a saving of only $1 per bale, yarn-manufacturing costs would have been reduced by about $7½ million. As of October 1, 1952, 13 commercial-size openers were in operation in 9 textile mills, and a number of additional machines had been ordered from the 9 manufacturers licensed under the Bureau patents to produce the machine.

12. *Advances in flameproofing cotton cloth for military clothing.*—The widespread use of flamethrowers, napalm bombs, and other forms of fire in modern warfare has made flameproofed cotton cloth for military clothing an object of intensive research in several organizations in a program coordinated by the Quartermaster Corps. The treated clothing must be comfortable to the wearer, flameproof, glowproof, and must withstand repeated laundering and dry cleaning; the treating process must be feasible for commercial use and should be of reasonable cost. The Bureau has made significant progress on this problem and has recently developed two laboratory processes involving the application of chemicals—one containing bromine and phosphorus and the other containing phosphorus and nitrogen—for application from water emulsions. By contrast, previously developed treatments have had to be applied from solvents, involving hazards most finishing plants are not equipped to cope with. Although the emulsion work is

still in a preliminary stage of development, efforts are being made to run pilot-plant trials as soon as possible.

13. *Controlled resting of wool improves processing efficiency.*—Investigations have demonstrated conclusively that improved wool-spinning efficiency results when carded or combed wool is held under tension on spools and permitted to relax before further processing. The benefits of this resting are hastened by steaming the wool on the spools. Improvement of spinning efficiency, estimated by reduction in the number of yarn breaks on the spinning loom, cuts the yarn repair time, reduces required supervision and hence becomes a major factor in cutting wool-processing costs. These findings form a sound scientific basis on which to develop the practical goal of providing the mill man with knowledge of when and how to apply accelerated processing to maximum economic advantage.

14. *New equipment for the flash heating and concentration of juices.*—Development work has been continued on equipment for the rapid concentration or sterilization of heat-sensitive fluid foods. In view of the highly successful results obtained with the original model of the concentrator, a much larger unit has been constructed and tested. This model has been operated in large pilot-plant production runs on apple juice and grape juice. The evaporative efficiency of the new model exceeds that of the conventional evaporators by 3 to 10 times. Commercial interest in this work is strong, and a number of commercial applications have been made on the basis of the Bureau's developments. At least two plants are using steam-injection heating to improve cloud stability in frozen orange-juice concentrate, and evaporators employing steam-injection heating are being successfully operated on a commercial scale on tomato juice, apple juice, and pear puree.

15. *Advancement in potato-granule technology.*—A new procedure involving solvent extraction has been devised for preparation of dehydrated mashed potato and significant progress has been made in research designed to improve current manufacturing practices. A new drier developed in the latter work is already in commercial operation producing potato granules for the Armed Forces. This product when perfected, may do for potato consumption what frozen concentrate has done for citrus-fruit consumption.

16. *Quality of processed sour cherries.*—The problem of soft cherries has reached serious proportions in an industry that produces over 100 million pounds of processed fruit annually. Solution of this problem would enable the sour-cherry industry to maintain a normal flow of processed fruit, thus benefiting the grocer, the processor and the consuming public. Research on this problem has provided basic information on the effect of fungicide sprays and processing conditions on the quality of the processed cherries. Results indicate that the use of wax-emulsion sprays in combination with fungicides is inadvisable; that the choice of fungicide sprays depends somewhat on climatic conditions during the growing season; that storage of harvested cherries in cold air is better than storage in cold water; and that the drained weight of cherries (a factor in the grading and sale) may depend significantly on the postharvest treatments.

17. *Flavor recovery in fruit processing plants.*—In the conventional commercial preparation of jams and preserves virtually all of the readily distillable fruit flavors are lost during the processing operations. Recovery of these flavor substances in the form of a concentrate that could be added back to the finished product, or used to flavor other fruit products, would, in addition to supplying better foods, represent a substantial increase in the monetary return from the fruit. Through engineering research a process has been developed for recovering, in the form of a flavor concentrate, the fruit flavors normally lost in the conventional commercial processing operations. The process employs the principles of the process developed by the Bureau for recovering and concentrating essence from fruit juices. So far strawberry, cherry, peach, and blackberry preserves have been studied.

18. *Potato chip bar.*—Although potato chips are a very popular food, they are not included in military rations because of their bulkiness. A nutritious and tasteful concentrated food product has been made by the Bureau from potato chips by compressing the chips into bars which occupy only one-twentieth the original chip volume. Properly prepared potato chip bars resisted deterioration for 6 months at 100° F.; this is a basic Quartermaster storage-stability requirement, and the test was conducted cooperatively with the Food and Container Institute of the Quartermaster Corps. The bars (each 3 inches by 1 inch by ¾ inch) possess the high caloric density required for military rations.

19. *High-density frozen-orange concentrates.*—Studies of the volatile flavoring constituents evolved during the evaporation of orange juice indicated the flavor

is primarily associated with the orange-oil fraction. During the evaporation process a major portion of this flavoring oil is lost. However, when juice fractions rich in orange oil are added to the concentrate the characteristic orange flavor is restored. High density (6 to 1) frozen orange concentrates have been successfully prepared in this manner. During storage these concentrates show less cloud loss and tendency to gel than do the conventional 4 to 1 products. High-density concentrates require fewer containers and occupy less low-temperature shipping and storage space.

20. *Better apple juice from Delicious variety.*—A study of the effect on apple juice quality of maturity, grade, and length of storage of Delicious apples has shown postharvest ripening for at least 2 weeks to be essential in the production of good apple juice from this variety. Juice quality also is improved by increased maturity at harvest. Juice obtained from C-grade fruit is almost equal in quality to juice from Extra Fancy fruit of the same harvest and handling history. Under suitable cold storage the fruit can be held from 4 to 6 months without loss of juice quality.

21. *Pink centers in frozen brussel sprouts.*—It has been found that the undesirable pink centers occasionally found in commercially frozen brussels sprouts can be entirely avoided by using adequate steam scalding in this essential prefreezing step. In addition to the pink centers, underscalded sprouts invariably develop undesirable odors and flavors during frozen storage. It was found that when hydrogen peroxide was applied to the cut surface of a raw or underscalded sprout a pink color appeared within a few minutes. This simple test can be used as a quick reliable test for the adequacy of blanching and will be useful to processors in controlling the scalding process.

22. *Retention of quality of dry beans during storage.*—In order to retain quality in dry beans during storage, it is necessary to know the limiting conditions under which the beans can best be held. Storage tests were made on several varieties of beans held at different temperatures, relative humidities, and in different gaseous atmospheres. At regular intervals the beans were cooked and judged by a trained taste panel. Changes were also followed by chemical and enzyme tests. Results show that stability is reduced at moisture contents above 13 percent; mold growth occurs at 20 percent moisture and above. Deterioration is markedly faster at 100° F. than at 70° F. Storage in vacuum, oxygen, or inert gases has no influence on the rate of deterioration at the 9 to 10 percent moisture level.

23. *Edible fat spread easily applied in Tropics or Arctic.*—A more suitable spread for bread for use in high- and low-temperature regions has been developed primarily for the Department of Defense. The spread is based on stable, nutritious combinations of liquid vegetable oil, meneglycerides or other modified fat, vitamins, flavoring, and emulsifiers. Such mixtures can be spread readily at temperatures from 0° to 110° F. or higher. Acceptability and stability tests are being conducted in cooperation with the Quartermaster Corps and the results are promising.

24. *Basic requirements established for metal inactivators to improve flavor stability of soybean oil.*—Basic information has been obtained regarding the type of chemical structure of substances that will inactivate metals in vegetable oils. Such metal inactivating compounds must be able, chemicllly, to react with the metal to form stable and inert compounds. Structurally, the inactivating compounds must have a reactive group which effects a primary reaction with the metal. In addition, these compounds should also have another reactive group which can stabilize the primary reaction to make the metallic impurities inert. The use of these principles, which are applicable to all edible fats, has led to the discovery of several new types of chemical compounds that are effective metal inactivators on a laboratory scale.

25. *Flavor of bread containing soy powder found acceptable.*—Nonfat soy flour contains highly nutritious vegetable protein and is available for use in bread. To determine its effect on the flavor of white breads, some containing 5 percent soy flour and others containing 4 percent nonfat dry milk solids were prepared in commercial baking equipment and subjected to flavor tests. More than 280 tasters from the Bureau's staff were unable to make a sufficient number of correct identifications in 1,300 tests to indicate a significant difference between the breads. The flavor of bread containing up to 5 percent soy flour, therefore, should not be a factor in the acceptability of such bread by consumers.

26. *New process developed for extracting oil from cottonseed with solvents.*—A new process, called filtration-extraction, for solvent extracting oil from cottonseed has been developed on a pilot-plant scale, and production trials with full-size equipment are under way in a cottonseed-oil mill. For applying the filtration-extrac-

tion process, the investment required for equipment and the cost of operation are both relatively low; yet high-quality oil and meal are produced. No radical or expensive departure from the operations now used to prepare cottonseed for hydraulic or screw pressing is required. This new development is attracting wide interest in an industry that is rapidly adopting solvent extraction. One manufacturer of oilseed processing equipment has advertised to build plants utilizing the filtration-extraction process as developed in the Bureau. Three equipment manufacturers are reported to have bid on plant installations utilizing the new process for the recovery of oil from cottonseed, rice, bran, soybeans, and flaxseed.

27. *New-type fats from cottonseed and peanut oil.*—Nongreasy, highly flexible fat products have been prepared by a simple and inexpensive process from readily available fats and oils. The new-type fats, known chemically as acetostearins, can be produced with melting points ranging from 80° F. to 140° F. and at least one company is preparing the new products on a pilot-plant scale and distributing samples to potential users for evaluation purposes. This development has attracted wide interest in the food industry because a need has long existed for an edible flexible material to replace paraffin and other nonfat coatings. If tests under way show that acetostearins are edible and digestible, the products may find use as coatings for cheese, weiners, ice cream bars, and other food products, and as a slab dressing in candy making.

28. *Improved metal resinates from gum resin.*—A new and practical method has been developed for preparing fused metal resinates of improved quality from gum resin. The key to the process is treating the resin with an aldehyde before fusing it with a metal compound to form the metal resinate. Compared with present commercial fused resinates, the new products have the advantages of containing a higher proportion of combined metal, being more soluble, and having greater resistance to damage by oxidation. Neutral fused resinates have been prepared by this new process from nearly all the common metals, in anticipation of special requirements for new resinous compounds. Prior to this development, the preparation of neutral fused resinates was considered impossible. A number of the aldehyde-modified metal resinates are being evaluated as paint driers, wood preservatives, special soaps, and corrosion inhibitors in greases. Metal resinates are a major outlet for resin, the current production of which exceeds 1 billion pounds annually. This significant development ultimately should improve the competitive position of resin, which has been replaced by metal naphtenates—a petroleum product—in a number of uses.

29. *Extraction of opiates from poppy straw.*—Patent applications have recently been filed by Bureau scientists describing a novel method for extraction of opiates from poppy straw. The method appears to be practical and is now being evaluated on a pilot-plant scale. The work was undertaken at the request of the Munitions Board to insure a domestic supply of indispensable opiates should foreign sources from which all present supplies are received become inaccessible.

30. *Useful chemicals from sugarcane byproduct.*—New premium-quality plasticizers have been made from aconitic acid—a byproduct now recovered commercially from Louisiana sugarcane molasses at the rate of one-half million pounds per year by a process developed in the Bureau. Plasticizers or softening oils are essential for the production of resin, plastic, and certain rubber articles. The new plasticizers were made by combining relatively inexpensive and commercially available alcohols with aconitic acid, and with tricarballytic acid, which is obtained from aconitic by a simple process. Evaluation studies by several chemical companies indicated that certain esters of both acids are better than a widely used commercial plasticizer. The recovery of aconitic acid in Louisiana can be increased at least tenfold—to 6 million pounds—by the addition of relatively small and inexpensive recovery units at strategic locations. The potential availability from Louisiana cane is 15 million pounds annually.

31. *Milling and processing data prove valuable in release of new variety of sugarcane.*—Cooperative research to speed evaluation of new varieties of sugarcane was described in last year's report. In continued work, the American Sugar Cane League furnished samples of 10 new varieties, the Louisiana State University experimentally milled the cane, and the Bureau investigated processing of the juice samples and recovery of the sugar. The release of the new variety C. P. 44–154 for commercial introduction in Louisiana was based on the data obtained in this work, together with the agronomic results obtained by the Bureau of Plant Industry, Soils, and Agricultural Engineering.

32. *Sugar-beet-top feed value conserved by dehydration.*—The yield of feedstuff—carbohydrate, protein, and carotene—from an acre of sugar-beet tops is comparable to that from alfalfa. When the tops are field-cured for forage much

of the feed value is lost through destruction of the protein and carotene. The development of a satisfactory preservation method could provide a million tons annually of needed, high-grade feed for the livestock industry. Financed by a research contract sponsored by the Bureau, the Colorado State Experiment Station has demonstrated that through dehydration of the tops in alfalfa or beet pulp driers the feed values can be largely retained. The results indicate the cash income of the beet grower may be increased 10 to 20 percent by handling the tops in this manner. This study has been completed and the results described in detail in the Colorado A. and M. College Technical Bulletin 47 entitled "Conservation of Sugar Beet Tops by Dehydration," May 1952.

33. *New maple food products.*—Two new food products prepared from the high-flavored maple sirup developed by the Bureau have recently come into commercial production. One, sold under the name "Spring Mill Syrup" is a table sirup containing 12.5 percent high-flavored maple sirup, 50 percent corn sirup, and 37.5 percent cane sugar sirup. The other is a maple cake prepared by reducing high-flavored maple sirup to solid form. The cake, sold under the name "Pure Maple Squares," is easily blended in the home with cane sugar and water to produce a table sirup virtually identical with pure maple sirup. The "Pure Maple Squares" product eliminates the housewife's keeping and storage problems, and reduces packaging and transportation costs.

34. *Dairy waste disposal.*—Wastes from dairy processing plants amount to about 1 percent of the milk processed, and stream pollution by these wastes is a serious problem. A simple microbiological process has been developed which greatly reduces stream pollution caused by waste in the effluent of milk processing plants. The process utilizes bacteria which convert the waste to additional bacterial cells, water, and carbon dioxide. The bacteria may be removed as a sludge, part of which is added to a fresh batch of waste to repeat the cycle. The sludge can be converted to a useful fertilizer. Through use of this process the pollution effect on milk wastes would be reduced approximately 95 percent.

35. *Oxidized animal fat compounds for use as plastic softeners.*—Another type of fat compound that is finding use as a plastic softener (plasticizer) is made from a wide variety of fats by a special oxidation (epoxidation) process developed by the Bureau. The products (epoxidized oils) are now being prepared commercially under license by the Department of Agriculture for use as plastic softeners, and are especially valuable for the so-called vinyl type plasticizers. Since the plastics industry requires enormous quantities of plastic intermediates (copolymers, plasticizers, etc.) and is expanding rapidly, uses of animal fats in this field represent a very large potential outlet.

36. *Thermostabilized (by heat treatment) shell eggs have altered functional properties.*—Various workers have shown that the candle grade after storage and certain other characteristics of the egg (for example, condition of the egg white) are favorably affected by the thermostabilization process. The process consists of heating eggs in oil held at 130° to 136° F. for 16 minutes. To be completely useful, such treated eggs must, of course, have adequate cooking or functional properties. Studies have revealed that the treatment causes an undesirable increase in the whipping time of the egg white and a decrease in the angel cake volume. No changes were evident in the sponge cake, plain cake, or custard-making properties of the eggs. A lower yield of egg white was obtained because the white tended to stick to the shell, and there was increased difficulty in separating the yolk and white. It is obvious that the acceptability of thermostabilized eggs will depend on the importance attached to these defects by the ultimate consumer of the egg. The research has therefore pointed out the factors that must be evaluated in determining consumer acceptance and the ultimate value of the stabilized egg.

37. *Retardation of rancidity in poultry meat.*—Rancidity is a major cause of decreased quality in stored frozen poultry and is thus an important factor limiting the shelf life of poultry, particularly turkey, which is both more susceptible to rancidity and is stored longer generally than chicken. It was early recognized that antioxidants would be useful, but the problem was in their application. After several unsuccessful attempts with various coating materials needed to carry the antioxidant, it was found that an aqueous gelatin coating containing one or more edible antioxidants markedly reduced rancidity development. Members of industry have inquired frequently about this development which may be especially useful in cut-up and deboned products because these products become rancid more quickly than whole birds due to the evident predisposition of rancidity to develop at cut surfaces. The antioxidant coating may also be quite useful whenever substandard packaging or storage is dictated by economic or military considerations.

38. *Fine papers and newsprint made experimentally from sugarcane bagasse pulp blended with woodpulp.*—Cooperative papermaking experiments at the Forest Products Laboratory showed that blends of bleached Florida bagasse pulp, prepared by the Bureau, with woodpulps produced improved magazine, book, bond, and newsprint papers. These papers had better formation, surface characteristics, and strength properties than the respective all-woodpulp papers. In newsprint papers the bagasse pulp can replace the 10 to 20 percent chemical woodpulp now used. Further experiments with a southern newsprint manufacturer showed that the blend of bagasse pulp results in a definitely stiffer and smoother newssheet. This company is considering installation of a semicommercial pulping unit for producing 10 to 15 tons of bagasse pulp per day to test the process commercially.

39. *New processing information available for the rural grinder of corncobs, fruit pits, and nutshells.*—A new industry comprising more than 24 plants grinding corncobs and 10 grinding nutshells and fruit pits has come into being. To provide technical information needed to make this business successful and to avoid the hazards of fires and explosions, the Bureau has made a detailed study of the most suitable methods of grinding and classifying the ground products of each raw material. Practical specifications for the products produced have been developed. This entirely new and practical information has been published in Bulletin AIC–336, Dry Grinding of Agricultural Residues—A New Industrial Enterprise, for which many requests are being received.

Statement of obligations under allotments and other funds

[Includes only those amounts which, by Nov. 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases]

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Research on strategic and critical agricultural materials, Agriculture (Bureau of Agricultural and Industrial Chemistry):			
Research on domestic production of natural rubber	$114,968	$117,300	
Investigations of domestic production of vegetable tannins	29,275	54,500	$54,500
Investigations on vegetable and animal fats and oils	69,309	63,000	
Total	213,552	234,800	54,500
Working funds, agriculture, agricultural and industrial chemistry, advanced from—			
Department of Defense, Department of the Army:			
Research on the flame-proofing of cotton textiles, and the retardation of flaming and afterglow of cotton	40,718	69,000	
Experimental studies of raw materials for dehydration of sweetpotatoes	9,846	22,000	
Development of suitable treatment for cotton so that it may be substituted satisfactorily for silk in the manufacture of cartridge cloth	14,034	15,000	
Research services in connection with the preparation of mammalian cholinesterase	2,563	11,000	
Research to determine the chemical changes in toxins subjected to various degrees of photochemical oxidation	9,901	20,000	
Research on a universal laundry dry-cleaning detergent cleaning liquid	6,970	15,000	
Study of the dehydration of fruits and vegetables	37,047		
Development of commercial processing techniques and production equipment for dehydrocanned fruits, particularly apples	11,833		
Determination of the changes in the physical and chemical properties of starch-water systems at selected concentrations	10,524		
Special project	18,215	41,500	
Synthesis of certain compounds for tests of plant growth regulators		5,000	
Research studies on the purification and identification of the product gibberellin produced by the organism fusarium moniliforme		15,500	
Research program on the differentiation of microorganisms by infrared spectra		30,500	
Department of the Navy: Study of dehydrofrozen foods (green peas, green beans, etc.)		30,000	
Total	161,651	274,500	
Obligations under reimbursements from governmental and other sources: Salaries and expenses	22,757	19,641	1,600
Total obligations under allotments and other funds	397,960	528,941	56,100

Mr. HORAN. We always have a very interesting statement when this Bureau comes before us and at this time we would like to have Dr. Hilbert give his statement.

Dr. HILBERT. Before I give my general statement, you may have noticed in the newspapers last week that Dr. W. W. Skinner, who was our former Chief of the Bureau, died on Tuesday, March 10.

Mr. HORAN. Yes, I noticed that.

Dr. HILBERT. Dr. Skinner was the grand old man in our Bureau, having devoted 40 years of service to the Department and to agriculture.

Mr. HORAN. I think he inaugurated this Bureau, did he not?

Dr. HILBERT. He was one of the leaders here for many, many years and he was one of the persons very instrumental in the regional laboratory development.

Mr. HORAN. I want to say at this point in the record that the Bureau of Agricultural and Industrial Chemistry has been a springboard for some of our leading chemical engineers in the field of agriculture. If it has done nothing else, it has produced many men who have gone into industry and have done a great job for American agriculture. It is one thing that is definitely a credit to this Bureau, and while we have lost them to Government, we have added them to industry and it has all been to the good.

Dr. HILBERT. I have a written statement, which I would like to present at this time.

GENERAL STATEMENT

The Bureau of Agricultural and Industrial Chemistry, as in former years, has conducted research designed to improve the utilization of agricultural commodities. One phase of utilization concerns converting to stable form the produce of our lands during the seasons when it is in greatest abundance to make it available for later use. In this way marked fluctuations in price between seasons of scarcity and seasons of abundance is avoided.

Another broad area with which we are concerned involves research directed toward reducing the cost of processing of agricultural commodities. We examine thoroughly present processing of agricultural commodities and conduct research to streamline processes. An important part of this work is the development of new and improved equipment. By these means the efficiency of processing is enhanced and loss and wastage of material is reduced to a minimum.

A third phase of utilization research deals with development of new and extended uses for agricultural commodities. This work is designed to create new and more valuable materials from products not now finding their most advantageous market.

NEW AND IMPROVED FOOD PRODUCTS

If I may I shall refer now to the problem of stabilizing food crops at the time of seasonal abundance to make them available throughout the year. The urgent consumer demand of recent years for products of quality equal to that of the fresh but which can be prepared for the table with a minimum of effort has in no wise diminished. Inherent in it is the advantage of decreased weight and bulk of foods to make

for convenience in marketing and for economy in transportation and storage in the home freezer or elsewhere. Quality, economy in transportation and storage and convenience in preparation are, of course, the very attributes most needed, too, by the military. In emphasizing them our work on new or improved food products is of equal interest therefore for military and civilian markets. Further, stable concentrated foods of first-rate quality may contribute significantly to development of new export markets for agricultural commodities to expand or replace those diminished in recent years.

The Bureau's research contributions in this field have continued to be effective. Commercial production of the stable dried egg your committee sampled a year ago is in full swing and much of the recent increase in packaged prepared cake mixes has been made possible by its availability. A number of commercial applications of our high flavor maple sirup process are well under way. The Navy has continued its interest in frozen concentrates, especially for subsistence on submarines and has recently tested a limeade concentrate which is not only excellent in quality but which could be manufactured in existing equipment during the season when the plants are idle; that is, before the orange season begins.

Of special interest to the Army Quartermaster has been a powdered orange juice developed by the Bureau which not only has the flavor of the fresh juice when manufactured but actually remains acceptable after 6 months storage at 100° F. Flavor stabilization and "in-package desiccation" which lowers moisture content to near zero are the joint keys to the product's outstanding shelf life. The unique manner in which ordinary vacuum-drying equipment was used successfully to prepare the orange powder appears applicable to other fruits as well. The great advantage of orange powder lies in its stability without refrigeration. With the added advantage of greatly reduced weight and bulk it can be supplied the world over without regard to availability of frozen storage. This, of course, opens up a large potential outlet both military and commercial for citrus fruit, production of which is bound to increase in this country for some years to come. The Army Quartermaster has supported a study of the manufacture of orange juice powder under commercial conditions which demonstrated that the process is quite feasible. Cost of the product, delivered at points distant from the source, would be no greater than that of competitive products which lack the vital advantage of adequate stability without refrigeration.

IMPROVED PROCESSING OF COTTON AND WOOL

Bureau research on utilization of cotton and wool fibers is conceived and carried on with a view to maintenance and improvement of their position in today's intense competition among fibers, natural and synthetic. Our vast chemical industries are bringing to the market in ever-increasing numbers synthetic fibers designed for specific jobs. Garments made from certain of them, for example, resist wrinkling. They are mothproof, mildewproof, and rotproof. They wear well and are simple to care for. Many require little or no ironing or pressing. But not one thus far is nearly as versatile as cotton and none has achieved the luxurious feel or the ability to take dyes well that characterizes wool. It is our purpose to improve our agricul-

tural fibers to make them competitive for specific uses and to lower the costs of processing them through improvement in procedures and equipment.

In respect to the last, I described to your committee last year the new cotton opener which at the time was just being introduced into the industry. Since that time, at least 15 openers are known to have been installed in 10 cotton processing plants. Enthusiastic reports of their performance are being received frequently and the manufacturers of the opener report prospects of 25 to 50 additional units being installed within the next few months. Another development concerns the operation of the card. The card is a device indispensable in cotton processing which receives fibers lying at random in all positions and delivers them parallel and ready for the next operation. The cotton is handled rather roughly on the card and opportunity for nep formation is good. Neps are the tiny tangled knots you see sometimes in cotton fabrics and they are, of course, important factors in lowering quality. Our research was concerned with adjustment of the various operating parts of the card. It was found that with optimum settings standard equipment could actually be speeded up by 40 to 60 percent without increase in neps or could be operated at intermediate rates with a very significant reduction in neps. This development, of course, is being adopted rapidly by the industry. One firm has estimated an annual saving of $680 per card of which the industry uses some 80,000.

Another of our attacks on the fiber problem utilizes cotton and wool as the preformed starting material for chemical synthesis of new fibers whose properties may well prove as startling and as useful as those of the wholly synthetic wonder fibers of today. We are conducting a thorough study of the partial acetylation of cotton. You are already familiar with the resulting fiber's remarkable resistance to rot, mildew, heat, and acid which has brought it into demand for such civilian uses as laundry press covers, dryer felts for paper mills, fish nets, soil soakers, and desert water bags; and such military uses as sandbags, webbing and cloth for parachutes delivering supplies from aircraft. Commercial production of acetylated-cotton fabrics started recently. These fabrics are being advertised as scorch-resistant covers for ironing boards in the catalog of a large mail-order house. As you know, too, they may prove suitable for manufacture of powder bags for military use. But acetylation is only one of a great many processes that may be used to prepare new fibers from cotton.

NEW USES FOR ANIMAL FATS

One of our urgent agricultural problems concerns animal fats which in recent years have suffered severe curtailment of both their traditional outlets. Shortenings prepared from vegetable oils have cut deeply into the market for lard, and synthetic detergents from petroleum are replacing a great deal of the soap that formerly provided the principal outlet for inedible animal fats. As a result, the market price of lard has dropped to the neighborhood of 8½ cents per pound and that for inedible fat to the low level of around 4 cents. Since these prices are only one-half to one-third that of the same fat in the form of the live hog, it is evident that a substantial deficit must be charged to the farmer or to the consumer. The figure actually

amounts to about $380,000,000 annually for hogs alone. It is but simple arithmetic to show that such a sum added to the price of the choicer cuts of pork amounts to over 5 cents per pound. Similar figures for cattle and sheep would be even more striking since the price on the hoof is higher and at the same time the proportion of low priced inedible fat to edible fat they produce is greater than with hogs. The problem is to find uses capable of absorbing enormous quantities of animal fats at prices equal at the very least to those paid for competitive vegetable oils or better still equal to those paid for the live weight. We are attacking it vigorously and are making significant progress along a number of lines.

The first of these involves testing the utilization of increased fats in pet and poultry feeds, an outlet estimated to be capable of absorbing 280 million pounds of animal fat. Results obtained under a research contract have shown that growth rate and feed utilization of male chicks is slightly superior, and dogs equal, when 4 percent fat is added to the basal diet. There appears to be a particular advantage for broiler production. No work has been done with turkeys as yet, but it is entirely possible that feeding of these highly stable fats could bring about a needed improvement in the stability of these birds during frozen storage.

Our second line of work on animal fats is directed toward their utilization in the production of hot dipped tin plate. This outlet could absorb 5 million pounds or more per year and the research has in addition an urgent defense significance since in present technology palm oil is used and this must all be imported. In hot dip tinning the steel sheet passes through a bath of molten tin where it is coated and then through one of hot oil which improves the distribution of the molten tin and provides a film to protect the hot sheet from contact with the air while it cools. A suitable oil, of course, must meet rigid specifications, some imposed by the product and some by the conditions of use. For example, no toxicity could be tolerated since the tin will be used for food products; flash and fire points must be high for obvious reasons. There are many additional requirements and animal fats as produced could not meet them. The preparation of a number of modified animal fats was therefore undertaken, and, after extensive laboratory testing, one known as hydrogenated deodorized white grease was chosen for testing on a full plant scale. The test, which has recently been completed, was carried out by a major steel company and proved wholly successful. With a pound of our modified animal fat it was possible to produce over three times as much plate as with a pound of palm oil. The research laboratories of four of the major can manufacturers cooperated in evaluating the product, which was found satisfactory in all respects. There is already some industrial experimental use of the new product.

Perhaps the most promising line of attack on the animal fat problem is in the field of plasticizers. It is probably not generally recognized that the myriad plastic products in evidence everywhere actually contain up to one-third or more of plasticizer without which they would not be possible. Most plastic substances unmodified would be brittle and unworkable. Several hundred million pounds of plasticizers are required annually in the United States. The price of these materials is such that modified animal fats could command a satisfac-

tory price and yet compete successfully in this market, if they had the right properties.

Introduction of additional oxygen into the fat molecule through a special process known as epoxidation yields an oily product compatible with the vinyl plastics and capable of plasticizing and stabilizing them. This is an important discovery, for the vinyls constitute one of the most useful classes of plastics but one for which effective plasticizers have been relatively few and expensive. No plasticizing substance heretofore available stabilizes them effectively, and this property of the epoxides may prove useful with other materials which cannot now be used owing to their tendency to deteriorate. This development is moving along very fast. At least three manufacturers are now offering on the commercial market epoxidized fats prepared by our process and three more are expected to be in production before very long.

It is proposed to follow the three promising lines I have outlined herein with others of equal potential and eventually to restore the animal fats to their proper place in industry, but it is a long-term job. The present plight of animal fats is a clear illustration of what inevitably follows when reliance is placed too long upon one or two major outlets. In this day of rapid technologic advance markets can be lost overnight and there is no safeguard except in vigorous and sustained research.

DISSEMINATION OF RESEARCH RESULTS

I should like to conclude with a few remarks on the manner in which our research, conducted in the interest of and for the benefit of the American farmer, is actually put to work for him. Most of our research has to do with processing and must be applied after the primary product leaves the farm though not necessarily after it leaves the grower's possession. Perhaps, the most direct channel in which our work flows to the farm is our cooperative effort with farmer cooperatives or their organizations. Among many examples may be cited our annual conferences with the cooperative soybean processor's association and with the similar organization of cooperative cottonseed processors. Our research on recovery of edible sirup from cores and peels of pears was done in the plant of a large fruit-processing co-op and our project on utilization of fruit-processing wastes as livestock feed was done with a large association of processors of which many of the members are cooperatives.

Actual joint participation in research is by no means confined to work with cooperatives. Such agreements are set up wherever mutual interest is evident, and they serve well in the accumulation of knowledge at reduced cost to the Government. Results of these and all Bureau projects are of course made available to the public at the earliest possible time. This is accomplished by every means at our command. Personal conferences with interested technical visitors average about 5,000 annually. We hold each year a number of commodity conferences in which representatives from the various segments of industry are invited to participate. In this way we get a picture of the important problems facing the industry. In the past year the subject matter of these has included citrus-fruit processing, cotton and cottonseed processing, soybean processing, fruit and vege-

table utilization, rice processing, and others. Bureau people contribute freely to the programs of growers and industry conferences and meetings as well as to those of the scientific societies. Most of the talks they give are reproduced in appropriate scientific periodicals, trade journals, and other publications. In addition, of course, we publish a great many other papers in the same journals and as Bureau publications. The Bureau played a leading role in preparation of the 1951 Yearbook of Agriculture which is called "Crops in War and Peace." In the past year over 400 publications emanated from the Bureau, of which over 300 described for the first time new knowledge gained through research. As in former years we have disclosed in patents many of our discoveries. During calendar year 1952 these numbered 84. A list of these patents is appended hereto.

United States letters patents issued to the Bureau of Agricultural and Industrial Chemistry, calendar year 1952

Patent	Patent No.	Date of issue
Fiberboard construction	2,580,391	Jan. 1, 1952
Reducing the crystallinity of native fibrous cellulosic material	2,580,491	Do.
Water-soluble combination products of gossypol and proteins	2,581,342	Jan. 8, 1952
Synthetic resins from maleic anhydride-alkyl oleate adduct and an alkylene diamine	2,582,235	Jan. 15, 1952
Water-soluble combination products of gossypol and amino acids	2,582,949	Jan. 22, 1952
Preparation of pentaerythrityl phosphates	2,583,549	Jan. 29, 1952
Acrolein and sulfur halide process to strengthen protein fibers	2,583,574	Do.
Stabilization of soybean oils with *p*-toluene sulfonic acid	2,583,602	Do.
Process for the continuous recycling of an alcoholic oil solvent in oil extraction	2,584,108	Feb. 5, 1952
Method of making partially carboxymethylated or phosphorylated cellulosic fibrous materials crease-resistant and dye-resistant	2,584,114	Do.
Preparation of nutlike products from dry beans	2,584,150	Do.
Reduction of oxydivaleronitrile	2,584,970	Feb. 12, 1952
Method of preventing deterioration of seeds	2,584,972	Do.
Mixed glycerol esters and their acylation products	2,584,998	Do.
Process for the treatment of egg whites	2,585,015	Do.
Preparation of novel food products from rice	2,585,036	Do.
Method and apparatus for heating fluids	2,585,970	Feb. 19, 1952
Method of stabilizing rice products	2,585,978	Do.
Separation of vinyl esters of long chain fatty acids from the corresponding free fatty acids	2,586,860	Feb. 26, 1952
Purification of rutin	2,587,600	Mar. 4, 1952
Cotton filled structural material and process of preparing the same	2,587,591	Do.
Acylation of dextran in formamide	2,587,623	Do.
Method of defatting starch	2,587,650	Do.
Method and apparatus for measuring dew point	2,588,355	Mar. 11, 1952
Preparation of granular polymers	2,588,398	Do.
Levulose dihydrate	2,588,449	Do.
Acylation of polysaccharides in formamide	2,589,226	Mar. 18, 1952
Preparation of keto acid compounds	2,589,314	Do.
Esters of acylated lactic acid	2,590,852	Apr. 1, 1952
Pentaerythrityl phosphoric acid esters of cellulose and processes of making the same	2,592,544	Apr. 15, 1952
Corn milling test	2,592,585	Do.
Method of treating egg whites	2,593,462	Apr. 22, 1952
Process for the preparation of inoculum for use in the fermentative production of sodium gluconate	2,594,283	Apr. 29, 1952
Process for the production of high purity tanning extracts	2,594,291	Do.
Acrylonitrile protein derivatives	2,594,293	Do.
Stabilization of glyceride oils with iminodisuccinic acid	2,594,294	Do.
Modified drying oils	2,594,303	Do.
Potatoe juice	2,594,308	Do.
Isolation of alpha-amylase from malt extract	2,594,356	Do.
Esters of polyhydroxy-benzoic acids and method for their preparation	2,595,221	May 6, 1952
Padder, mangle, or squeeze rolls for improved extraction and impregnation of textile fibers, yarns, and fabrics	2,596,154	May 13, 1952
Preparation of starch sponge	2,597,011	May 20, 1952
Pine gum distillation	2,598,684	June 3, 1952
Preparation of drying oils	2,598,729	Do.
Production of alpha-carbalkoxyalkyl methacrylates	2,599,549	June 10, 1952
Vulcanization of acrylic resins	2,600,414	June 17, 1952
Method of bonding using head sealing protein adhesives	2,600,388	Do.
Apparatus for cleaning cans	2,601,746	July 1, 1952
Process for the manufacture of solium gluconate	2,602,768	July 8, 1952
Ether-esters of polyhydroxy compounds	2,602,789	Do.
Shock-resistant product	2,603,156	July 15, 1952
Stabilization of glyceride oils with acetone dicarboxylic acid	2,605,186	July 29, 1952
Amides of 9, 10-dihydroxystearic acid	2,605,270	Do.

United States letters patents issued to the Bureau of Agricultural and Industrial Chemistry, calendar year 1952—Continued

Patent	Patent No.	Date of issue
Polymerization of polyallyl and polymethallyl ethers of polyhydroxy compounds	2,606,881	Aug. 12, 1952
Isolation of pea proteins	2,607,768	Aug. 19, 1952
N,2-carboalkoxyethyl derivatives of alpha-amino acids and of acylated alpha-amino acids	2,607,797	Do.
Fiber doffing device	2,607,958	Aug. 26, 1952
Method of producing amides	2,608,562	Do.
Process of the production of amylose films	2,608,723	Sept. 2, 1952
Process of reacting polyvinylalcohol with urea phosphate	2,609,360	Do.
Production of quick-cooking rice	2,610,124	Sept. 9, 1952
Skin cleaning composition	2,610,153	Do.
Foam breaker for submerged culture fermentor	2,610,155	Do.
Esters of acylated hydroxycarboxylic acids	2,610,196	Do.
Preparation of dried eggs	2,610,918	Sept. 16, 1952
Slurry adsorption separation and fractionation of sugars	2,610,931	Do.
Polyvinyl phosphoric acid esters of cellulose and processes for making the same	2,610,953	Do.
Synthesis of organic peroxides	2,610,972	Do.
Stabilization of glyceride oils	2,610,973	Do.
Production of stabilized forage crops	2,611,703	Sept. 23, 1952
Production of potato chips	2,611,705	Do.
Method of coating foods with pectinate or pectate films	2,611,708	Do.
Polymeric plasticizers	2,613,157	Oct. 7, 1952
Separation of pear waste into its liquid and solid components	2,614,933	Oct. 21, 1952
Alkyl carbonates of lactates	2,615,914	Oct. 28, 1952
Production of expanded rice products	2,616,808	Nov. 4, 1952
Process of making soluble yarns and threads of partially carboxymethylated cotton	2,617,707	Nov. 11, 1952
Recovery of values from waste cantaloupe	2,617,728	Do.
Antibiotic production from streptomyces griseo-carneus	2,617,755	Do.
Process for deresinating rubber from plants	2,618,670	Nov. 18, 1952
Production of mushroom mycelium	2,618,900	Nov. 25, 952
Preparation of dehydrated carrots	2,619,424	Do.
Dried honey-milk product	2,621,128	Dec. 9, 1952
Polymerization of allylic ethers	2,623,864	Dec. 30, 1952

United States letters patents issued to other bureaus of the Agricultural Research Administration, calendar year 1952

Patent	Patent No.	Date of issue
1. Stick remover for seed cotton extracting machine	2,581,451	Jan. 1, 1952
2. Combination dusting and spraying machine	2,583,650	Jan. 29, 1952
3. Process for purification of parathion	2,605,279	July 29, 1952
4. Crystalline isomer of allethrin	2,607,796	Aug. 19, 1952
5. Insecticide dispenser	2,610,433	Sept. 16, 1952

No. 1, issued to Bureau of Plant Industry, Soils, and Agricultural Engineering. (Improvement of cotton ginning machinery.)

Nos. 2 through 5, issued to Bureau of Entomology and Plant Quarantine.

No. 2: A combination concentrated sprayer and dusting machine instantly convertible that will: (1) Effectively apply required amounts of insecticides or fungicides which can be varied from 1 to 10 gallons per acre; (2) apply insecticides and fungicides as a concentrated spray and simultaneously apply insecticides as a dust; (3) apply atomized moisture which may or may not include adhesives and spreader agents to foliage simultaneously with dust, and (4) apply dust alone in conventional way.

No. 3: A process whereby special solvents, wash solutions, regulated temperatures, and absorbents are used to extract impurities from commercial and technical parathion in order to obtain an odorless and substantially pure parathion that will be less injurious to foliage when used on plants for insect control.

No. 4: A process whereby a crystalline compound useful as a chemical and biological standard is separated from allethrin or allethrin-like compositions.

No. 5: A dispenser providing for the introduction of a compressed gas into a tube and for diverting a portion of the gas into a tightly capped container holding a free-flowing insecticide. The insecticide suspended as individual particles in the gas is discharged from the dispenser at high velocity.

APPLE CONCENTRATES

Mr. HORAN. You mentioned something about apple concentrates, have you actually developed something?

Dr. HILBERT. Yes; we have. I just briefly refer to it in my statement. Only a sentence or so is devoted to that, but I would be very glad to go into it in some detail.

Mr. HORAN. Apples differ from citrus fruits. They are much more difficult to work with.

We developed an apple essence about 6 or 7 years ago, but it has very little commercial application so far.

Dr. HILBERT. Yes, sir.

Mr. HORAN. And, of course, one of the objectives of your work in this Bureau is overcoming the handicap of transportation, which affects particularly such areas as Mr. Hunter's district and mine.

Have you developed an apple concentrate that is practical?

Dr. HILBERT. We have developed an apple concentrate, which is a 4-to-1 concentrate. That work was done in cooperation with the Washington State Apple Commission, with the Washington State Experiment Station and with the Bureau of Agricultural Economics. In other words, it was a large team that developed this product. The Washington State Apple Commission turned over to the Western Regional Laboratory several tons of Delicious apples, Winesap apples, and a number of other varieties. The purpose of this was to find out what blends would give the best flavored apple juice. Those apples were processed in the Western Regional Laboratory and the cans were made available to us, with labels, by the Washington State Apple Commission. All told, there were several thousand cases of that apple juice produced. The marketing of the product was then done in cooperation with the Washington State Experiment Station and the Bureau of Agricultural Economics. The marketing experiments were conducted in 3 different cities: 1 was in Texas and I believe 2 of the cities were in California.

The product was shown to be desirable from the standpoint of the consumer, because they went back for more and there were repeat orders on it. That was 2 years ago. This past year the Bureau stepped out of it and the Washington State Apple Commission, in cooperation with an industrial company, produced a much larger quantity of the 4-to-1 apple concentrate, with the aim of carrying on a more extensive marketing study. That product was sold in the summer of 1952, and it, again, was quite popular.

This past year, I understand that the apple harvest in the Pacific Northwest has been rather short. This processing season they are not expected to produce any more than they did this last year. That is the story on 4-to-1 frozen concentrate.

Another product that we have worked on is a canned apple concentrate juice. This work, again, was done in cooperation with the Washington State Apple Commission and the Washington Experiment Station. We operated practically the same way as we did with regard to the frozen concentrated juices. That product was marketed by an industrial concern.

Mr. HORAN. It was marketed commercially?

Dr. HILBERT. Yes, sir; and this was a marketing test. The concentrated canned apple juice was sold in a large supermarket in San Francisco over a period of about 16 weeks. The company had demonstrators present in the large supermarket in order to interest the consumer in purchasing it. As a result of that study, it was shown that the canned, concentrated apple juice was more popular than the blend of single strength juice featured by the supermarket. However, as soon as the demonstrators left, then the sales in the concentrate canned juice fell off. Apparently, the consumers were inclined to

confuse it with inferior beverage bases and also with single strength juices. The results of that study showed very definitely that in order to sell concentrated apple juice, it would be necessary to carry on a vigorous promotion and advertising campaign.

Mr. HORAN. Well, of course, that is the business of the industry itself. You people have blazed the trail by helping them to produce something that is transportable, and that is the important thing.

The difficulty of selling cider is that about 90 percent of it is water and that is what you are shipping. Of course, we had high hopes that the apple essence might be useful, but it is too difficult to use.

Dr. HILBERT. The apple essence is used in making this concentrated apple juice.

Mr. HORAN. You are building on the work then that was done at Philadelphia some 10 years ago?

Dr. HILBERT. That is right.

Mr. HORAN. I am glad to hear that. One of our problems is to get rid of our low-grade fruit.

Other members of the subcommittee may not know it, but there is a tremendous variance of flavors in apples.

POWDERED ORANGE JUICE

Dr. HILBERT. Another important development in the food field has been the development of a process for producing powdered orange juice. The powdered orange juice has the same flavor as the raw material from which it is made. I say, "the same flavor of the raw material from which it is made," as it was prepared from frozen concentrated orange juice. I have samples of that product in case you would like to test it.

Mr. HORAN. I think it would be nice to pass those samples around.

Dr. HILBERT. An important feature of the process is that it is dried under a high vacuum. It is called the "puff dry" process. When mixed with water it is readily reconstituted. I might say that orange powders have been produced experimentally in the past but never satisfactorily. This is the first satisfactory one that has ever been produced. It has a storage life of 6 months at 100° F. That is important from the standpoint of the military. In other words, it does not have to be refrigerated. Another important factor which is responsible for the success of this process is that the flavor is locked in with a chemical. When orange juice is dried down, all the flavor is lost. That flavor is recaptured as the essence and then locked in with a chemical and added back to the concentrated juice solids.

Mr. HORAN. Where was this work done?

Dr. HILBERT. This work was done in the Western Regional Research Laboratory. The reason why the powder is so stable is that the moisture content is below 5 percent and it must be below 5 percent if it is to have such a long storage life. In order to drop the moisture content down, we have introduced a metal disk which contains a drying aid and that has to be separated from the powder before it is added back to the water.

Mr. HORAN. It has to be separated.

Dr. HILBERT. There is a metal disk of about 1 inch in diameter and about one-half inch high and it has a drying aid in it. You will probably find that it lies loosely on top of the powder. You just

remove it and add three cans of water back to the powder in order to make an orange juice. The significant thing about this product is that, from the standpoint of exportation, it has a great deal of promise, because it does not require refrigeration. Foreign countries have shown a great deal of interest in this product. In foreign countries they do not have the refrigeration facilities which we have in this country, that is refrigerated warehouses, or even refrigerators in the home. They have never been interested in our frozen concentrated orange juice.

Mr. HORAN. I do not doubt but what my hometown has more cold storage plants than the whole of France.

Dr. HILBERT. Yes, sir.

Mr. HORAN. At this point, I would like to comment, and I think Mr. Hunter will bear me out, that none of our commercial producers of fruits and vegetables ship more than 75 percent of their total production to market because of grading rules and the high cost of transportation. That is particularly true in the West where we are very far from our markets. This sort of research, therefore, takes on an added significance. Even though the producer doesn't materially benefit from this research, he at least recovers part of his production costs, or moves in that direction, and you can see how important that is. We cannot ship low-grade fruit where it is off color or undersize or where anything else is wrong with it. But if we can, through research of this nature, move it to market and get something out of it, such a project will help the consumer worldwide, and we are doing something of great importance.

STRETCH BANDAGE

Dr. HILBERT. In the field of cotton and wool, you will recall that I referred last year to the cotton "two-way stretch bandage," which had been developed and which was to be produced concurrently by two commercial companies. The Department of Defense placed a large order for that cotton bandage and it is now actually in commerical production. Here is the commercial product [illustrating]. You might be interested in seeing the way it is packaged by the industrial companies who are producing it for the Department of Defense.

This is the "burn" package that the Department of Defense uses in case of serious burns [illustrating]. Inside of this package is a pad. You reach around in this way and then the two-way stretch bandages are used on the outside, for instance, here and here. If you recall, the two-way stretch bandage permits more flexibility at the elbow and it is much more comfortable for the patient.

ROCKEFELLER FOUNDATION AWARD

Mr. HORAN. You received a special award this past year. Would you tell us what that was for?

Dr. HILBERT. That was a Rockefeller Distinguished Service Award. A year ago the Rockefeller Foundation made available a certain sum of money to Princeton University to permit Government employees to carry on special studies, similar somewhat to sabbatical studies. The Government does not have the authority, at least Department of Agriculture does not, to send employees away for further studies.

I understand there were 750 applicants and I believe there were 11 awards made. I received one of those. Of course, I secured the approval of the Department before I submitted my application. I intend to go to the Harvard Business School during the fall for 3 months to take a course that is given for executives. This will be done at no cost to the Government.

Mr. HORAN. That is most commendable.

NEW OUTLETS FOR ANIMAL FATS

Dr. HILBERT. With respect to animal fats, the price has dropped very seriously in the last few years, which has been due to two reasons: One is the reduction in our export markets and the other has been the increased competition from synthetic detergents. The largest use, of course, for inedible fats has been in the soap industry. Synthetic detergents have gradually been taking over this use of fats. There is a real need to develop new outlets for animal fat. During the past year we developed one use as a result of the basic work we have done in the Eastern Laboratory. The product is called epoxidized oil.

Mr. HORAN. What does that mean in the language of the layman?

EPOXIDIZED OIL IN PLASTICS MANUFACTURE

Dr. HILBERT. That concerns the introduction of an additional oxygen atom into the fat molecule. When that additional oxygen is introduced into the fat, its properties are changed remarkably. Epoxidized oil is used as a plasticizer for the vinyl type of plastic. Three commercial companies have started to produce the product this past year. There has been an indication that others will be producing it too. This is the type of material that is produced using epoxidized oil as a plasticizer [exhibiting product to committee]. Thirty to 35 percent of that product, which is seat cover material for automobiles, contains this epoxidized oil. Plasticizers are necessary to increase the softness of the material. A plastic without a plasticizer is extremely brittle and the softness of that is due to the fact that this plasticizer has been added to it. You might say that a plasticizer is an internal lubricant.

Mr. HORAN. That is another contribution which your Department has made. Are you entitled to all the credit for it?

Dr. HILBERT. Yes, we are—not for the plastic but for the plasticizer.

Mr. HORAN. Plastics were oversold when they first went on the market and they were not a substitute for leather by a long way.

Dr. HILBERT. The basic work on developing these plasticizers was done in 1946 or 1947. We took out public patents on the process for epoxidizing oils. The three companies that are producing it have received licenses from the Department to produce it.

Mr. HORAN. This is tile flooring [examining product handed to him]?

Dr. HILBERT. Yes, sir, and this is still another one. That is a plastic hose and probably 20 percent of the weight of that plastic hose contains this plasticizer.

Mr. HORAN. What is the chemical name for this product?

Dr. HILBERT. Epoxidized oil. It is a technical name. Here is a product that is made by one of the industrial companies.

Mr. HORAN. This is a detergent?

Dr. HILBERT. No, sir; that is really an oil. We have introduced oyxgen into these animal fats. They are also using some soybean oil in producing this type of product, but it is really an internal lubricant to prevent the plastic from being brittle, it makes it soft.

Dr. IRVING. I might add at this point that the internal lubricant is correct. The fats themselves are not compatible with plastic, but this epoxidizing process makes them compatible with the plastic mix and it will stay there and retain its flexibility.

Dr. HILBERT. In the field of animal fats we have also carried on through a contract with the Armour Institute of Technology an investigation on the substitution of palm oil, which is imported, and which is stockpiled, with animal fats for the tinplating of iron. The work was done in cooperation with industry. Industry actually made a 40-day run, using animal fats in place of palm oil. The experiments were found to be very successful.

INCREASED USE OF ANIMAL FATS IN DIET OF DOGS AND POULTRY

Still another potential new outlet has been opened up, and that concerns the value of increasing the fat content of the basic diet of dogs and of poultry. The interest in this has been tremendous.

Mr. HORAN. Do you increase their appetites?

Dr. HILBERT. Well, it does not increase their appetites, but in the case of dogs the basic diet contains around 4 percent animal fat. The diet was increased to 6 and 8 percent. The study of the effects on the nutrition of dogs was done through this contract. Again, the Bureau did not do this work, but we financed it.

Mr. HORAN. We are very much in favor of that; wherever possible, we would like to have you use the contractual method, because it increases the cooperation between your Bureau, our land-grant colleges, and other areas of research and development that can be of use. That is one point on which this subcommittee has always agreed, and we would like to have you always use your contractual authority wherever possible, because that develops cooperation.

Dr. HILBERT. The dogs seemed to have a nicer fur when the fat content was increased. In the case of chickens, when the animal fat content of the diet was increased, the quality of the bird seemed to improve. This work was done by the American Meat Institute. As a result of this work one of the large packers immediately started experiments of their own to confirm the work done by the American Meat Institute, on the effect of increasing the fat content of the diet and improving the quality of the birds.

Mr. HORAN. That was animal fats?

Dr. HILBERT. Yes, sir; animal fats.

Mr. HORAN. The principle involved here is that if you can add something to the diet you can increase the appearance. There is no question about that.

Dr. HILBERT. That, very briefly, summarizes my statement.

PATENTS ISSUED TO BUREAU

Mr. HORAN. I note at the end of your statement you have listed the public-service patents. I would like to have you point out the

ones which you think should be brought to our attention. I do not think the average American realizes what some of our good people in Government do and what they really contribute to our progress. I want you, Dr. Hilbert, to take credit where credit is due here, and proper credit should be given. You can mention names if you like.

Dr. HILBERT. The list covers 84 patents granted to the Bureau in 1952. It includes the title of the patents and the date of issue, as it has actually been issued to the personnel of the Bureau during the past year. All of these patents are assigned to the Secretary of Agriculture, they are not public-service patents. The distinction between the two is that in a public-service patent anyone can use it, and it is not necessary to get the permission of the Department or of the individuals. When a patent is assigned to the Secretary of Agriculture and a company wishes to take up the development, they request the approval of the Department; and, of course, in the case of all reputable companies, that permission is granted as a matter of course. I do not recall any company which has ever applied for a patent that did not receive approval to use the patent. As all of our important developments are covered by patents, we just automatically take out a patent when we develop a process which has promise. For example, the basic patent for the epoxidized oil that I referred to is held by the Bureau. You recall that the Bureau developed a basic process for producing penicillin, and these basic patents are also held by the Department.

The basic patents on frozen concentrated orange juice are held by the Department. In the development of the central still for processing pine gum, the patents are held by the Department. We have filed for a patent on the orange powder. In my testimony so far, I have not mentioned dextran. This is a blood-plasma substitute on which we have a patent. We also have patents on the production of vitamin B_{12}, the anti-pernicious-anemia factor.

Mr. HORAN. Would it be possible for you to give credit to individuals, Doctor, in this list of 84 patents, or would it be too cumbersome?

Mr. HILBERT. It is rather cumbersone. I would say the number of people that have been involved on these patents would number, perhaps, 300 or 350.

Mr. HORAN. It is obviously impossible, Dr. Hilbert, to give credit to any individual or to 2 or 3 individuals. A lot of these departmental public patents are the result of the teamwork of numerous people in the Department, and particularly in your division. It is not necessarily entirely in your division, because you have contractual or other relations with all of the bureaus.

Dr. HILBERT. I appreciate very much getting your comments on that, Mr. Chairman. I know the employees will. When Dr. Shaw appeared before the group more than a week ago, I think you asked him to submit for the record a list of patents.

Mr. HORAN. Yes; I did. He said when you appeared you would do so.

Dr. HILBERT. In addition to the list of patents issued to the employees of the Bureau, there is also a list of patents issued to the other agencies of the Agricultural Research Administration included along with my list in my general statement.

COOPERATION WITH STATE EXPERIMENT STATIONS

Mr. HORAN. Dr. Hilbert, could you comment briefly on the extent of your cooperation with the State and private organizations doing research? Just how do you do that? You have quite an activity in the contractual authorization field, do you not?

Dr. HILBERT. That is correct.

Mr. HORAN. I think it is very much to your credit that you do. We would like to encourage that if we can.

Dr. HILBERT. Shall I take first the cooperation with the experiment stations?

Mr. HORAN. Yes.

COLLABORATION AMONG REGIONAL EXPERIMENT STATIONS

Dr. HILBERT. When the regional research laboratories were established, the Department felt it would be desirable if the Bureau appointed as collaborators a representative from each experiment station. The experiment stations are broken down into four regions—the western region, the northern region, the eastern region, and the southern region.

In the northern region each of the experiment stations has selected a collaborator. Those collaborators come to the northern regional laboratory once a year. The sessions last for 2 or 3 days. We give them a complete picture of what we are doing. At times the experiment station collaborators give us a picture of what the experiment station has under way. Where there are problems of mutual interest, it tends to facilitate cooperation. That is the way it is done at the northern laboratory.

In the western region the directors prefer to have the collaborators come in individually, and to talk with the various scientists in the laboratories. We do not have a group meeting in that case.

STUDIES IN METHODOLOGY

At the eastern laboratory the directors each year select the topics which they would like to have discussed at the annual collaborators' meeting. For instance, this past year the topic was methodology. In other words, within the last 5 years many new tools have been developed by chemists; and the experiment station directors felt it would be desirable for their research personnel to get this overall picture of the recent advances that have been made in the field of methodology.

Mr. HORAN. By "methodology" just what do you mean?

Dr. HILBERT. For example, the new methods for separating all of the components in agricultural commodities.

For the last 2 years we have had under way studies to get a comprehensive picture of all the components in orange juice. There are special techniques used to separate those components.

Mr. HORAN. In other words, you are talking about the research procedure?

Dr. HILBERT. The research procedure with the aim of improving efficiency of the work. Instead of taking 5 years to get the result, we want to get the result in a year.

Mr. HORAN. You are looking for shortcuts to the end result?

Dr. HILBERT. That is correct.

Another type of methodology is to use infrared spectroscopy. Infrared spectroscopy is used by taking advantage of those wavelengths in the infrared region, which is on the red end of the spectrum, to identify the components in animal fats. The method that we have developed has been published, and that procedure was made available in these discussions. They were shown the apparatus. We had a talk for an hour on it. They gave a complete picture as to how the people in the experiment stations can use it.

That was the nature of the conference at the eastern laboratory.

In the southern region the directors generally select a commodity to be discussed. For example, one year they feel it will be desirable to discuss completely cotton; not only the agronomic improvements that are made, but the latest improvements in developing new uses for cotton.

Mr. HORAN. You have done some outstanding work on cotton in the last 10 years; is that not true?

Dr. HILBERT. That is true; we have.

That is the way we cooperate and work with the experiment stations.

In addition we visit them to get a more complete picture of the experimental work which is being done in the experiment station and to avoid duplication of work. Actually, we have formal cooperative work under way with 32 of the 48 experiment stations.

COOPERATION WITH PRIVATE INDUSTRY

Mr. HORAN. How do you cooperate with private industry?

Dr. HILBERT. With private industry we work in a number of ways. Wherever possible we solicit their cooperation. We try to get to their cooperation as early in a development as possible, because the more of a picture they get the more inclined they are to carry on the development.

RECOVERY OF SUGAR FROM PEAR WASTE

We even take advantage of the facilities of industry; set up a pilot plant in a particular company, and so forth. We will send our men to work in the pilot plant, because the industrial companies have the raw materials.

For example, I mentioned the work we were doing a number of years ago with the Hood River Apple Growers Cooperative on a technical development for getting the sugar out of pear waste. In the canning of pears tremendous quantities of sugar are produced. The waste is just lost. At times it is just dumped into a stream, or is trucked out into an area where there are not too many people living and dumped on the ground. The sugar content of the pear waste is about the same as that of cane sugar juice.

Mr. HORAN. Yes. If you take the Bosc pear, it has a very heavy level of sugar. In fact, if you dry them they will almost crystallize. Can you do that commercially and economically?

Dr. HILBERT. Well, the company has carried on, you might say, almost a semicommercial test of it this past year. They produced several thousand cases of canned pears containing the sugar from the

waste, to find out what the effect is on the consumer. Will the consumer notice any difference in flavor? The consumers noticed no difference in flavor.

We think the company will go ahead and utilize that pear waste for producing the sugar, and then using the sugar in their own operations.

Mr. HORAN. It is a higher grade of sugar than any on the market, if you can produce it.

Dr. HILBERT. It is a very fine sugar.

We have work under way with 62 companies. In these cases the company is contributing a great deal. It is contributing raw materials or facilities, and it is contributing manpower.

Mr. HORAN. Are you aware of the fact that at least one of the people producing plastics has been saved by your work? I know of one organization which was on the way out until they got something into their plastics which would make them more flexible. They were just about to fold up. Nobody was going to buy their product. I hope they appreciate the work you folks have done.

Mr. ANDERSEN. Dr. Hilbert, I want to join with my colleague, Mr. Horan, in an expression of appreciation for the experiment work your organization is doing. In fact, it is one of these organizations we more or less take for granted from year to year. We do not look too suspiciously upon your work, because we know you are doing a good job. The fact that you list here all of these patents for everybody in the market to use in the future indicates, to me, the real value of this $8 million investment.

UTILIZATION OF ANIMAL FATS

Doctor, I am very much interested, since I come from the Midwest area of the country, in the part of your opening statement dealing with new uses for animal fats. You state in that particular paragraph that the farmer stands to lose $380 million annually on hogs alone because of the fact that the market price of lard is so far below what it should be in proportion to the meat carried by the hogs.

The big problem facing us is to find new uses for this animal fat so as to make it carry its percentage of the general cost of the animal. Thus we would not penalize the producer to the extent you mention here, $380 million annually. That is a lot of money.

USE IN MANUFACTURE OF PLASTICS

I am very pleased to see that you feel that you are finding certain outlets through your research. I believe the most promising line of attack which you mention is in the field of plasticizers. That could develop into quite a thing, could it not, Doctor?

Dr. HILBERT. That is right. We feel that the potential volume is 150 million pounds. That is the quantity of plasticizer which is now being used in the vinyl type of plastic, which is the type of plastic produced in the greatest amount. That is one outlet.

USE AS FOOD FOR DOGS AND POULTRY

We feel also that the outlet in feeds for dog food and for poultry is promising.

Mr. ANDERSEN. That might even develop a greater quantity than the other.

Dr. HILBERT. That is right. We think it will. At the present time our work has been confined a bit. When I said "poultry" I referred only to chickens.

In the field of turkeys, we have done work in the last 2 years, in cooperation with the experiment stations, which has shown that the rancidity of turkeys is due to the fat in the turkey, and that the rancidity of the fat is directly related to the type of fat that the turkey ingests. In other words, if the fat is a fish oil then the fish oil, instead of being consumed by the turkey, is laid down in the turkey fat which may account for the fact that turkeys at times have a fishy flavor. As I say, this has just been recognized in the last 2 years.

We feel that animal fats, many of which are very hard, should reduce the rancidity of turkey fat. For example, beef tallow is a hard type of fat which does not become rancid as fast as a soft fat or a fat from a vegetable oil. This next year we probably will let a contract with the American Meat Institute to have them follow up their studies on chickens by using turkeys in place of chickens.

Mr. HORAN. I hope they do, because that is where our Federal Government can do more good than by doing it all themselves, Dr. Hilbert. I just hope that you cooperate with all of our experiment stations, land-grant colleges, and all of our institutions which are privately endowed.

Mr. ANDERSEN. I notice that you are doing some work relative to making a more suitable spread for bread for use in high- and low-temperature regions.

Dr. HILBERT. Yes.

Mr. ANDERSEN. This has been done primarily for the Department of Defense. Now, I hope you will not forget, Doctor, that our Nation is in difficulties with the quantity of butter which it is producing. This line of work should perhaps be centered around butter as far as possible.

Dr. HILBERT. Yes.

Mr. ANDERSEN. I am one of those who believe that, in any of this research, the more we can do to solve existing problems the better off we are. Furthermore, that research is more apt to make a favorable impression upon the people of America under those circumstances.

Mr. HORAN. Dr. Hilbert, I want to thank you for the discussion so far. I think it has been very good. I want you to realize that this subcommittee is very much interested in the work of the Bureau. We have Mr. Whitten from Mississippi, who comes from a State which is very much interested in your cotton research. We have Mr. Hunter, from Fresno, Calif., who is very much interested in much the same things that I am, high transportation costs, and so forth. We have Mr. Laird, from Wisconsin, who has been close to your work in that State, I know. We also have Mr. Marshall, from Minnesota, along with the chairman of this subcommittee. They are interested particularly in any work you can do which will help us where we have a high production potential and where we sometimes have problems of surpluses, as we do in butter today.

With that, I should like to call on Mr. Whitten for any questions he has of a general nature.

Mr. WHITTEN. Doctor, I have listened with a great deal of interest to your general statement. As Mr. Horan has pointed out, I come from the central South and we are very much aware of the problems

of cotton. We have followed the work of your New Orleans laboratory very closely and are very proud of the many fine things that you have come out with. We appreciate the report you have given today as to the present status of the work.

BALANCE BETWEEN RESEARCH AND ACTION PROGRAMS

There is one thing which I have trouble following on this committee, and that is how we can maintain a balance. A friend of mine from my State, who is quite an outstanding and successful farmer, and who is identified with research, said that in his opinion you could not have too much money for research. My answer to him was that if money were unlimited that, of course, would be true; but if you had a limited amount of money you had better spend some of it to put answers you already knew into use as against spending all of the money for more answers. I do feel we could well increase the research program, however.

Too frequently, it seems to me, a group which is interested in one particular phase decides that the way for them to get ahead is to try to cut down the efforts being made in another phase. I have heard many people say that Congress has not gone along as fast as the enabling act permitted with research, and who insist that we need to greatly expand our research program in the Department of Agriculture.

I hope we can do that. Some few people, I think, in the name of research are trying to eliminate efforts in other directions, such as putting into practice the things we already know.

I would like for you to tell us whether you feel research is staying sufficiently far ahead of the action programs to give us something to drive at, or whether the workers behind you are catching up faster than you can come up with new fields for them to conquer? Of course, I realize you work with your own phase. Frankly, I would want to ask the same question of the people in the action program, and a composite of what each of you says will largely enable me to reach a conclusion. I think it is an answer that Congress needs.

Dr. HILBERT. Yes. I think that research is definitely far behind our action programs. What I have in mind is one thing in particular.

SURPLUS POTATOES UTILIZATION

For instance, let us take potatoes. Several years ago I think it cost the Department in the neighborhood of around $400 million. That action program lasted for about 2 or 3 years. We did not have the answers at that time as to how best to use potatoes. At one time the Department considered burning the potatoes, just to get rid of them.

In developing uses for potatoes it is extremely difficult to develop a use which is economical considering the price-support program of potatoes compared to the price-support program of corn. For example, when corn sells at $1.50 a bushel, that corn only has about 15 percent water. Potatoes, as I recall it, had a support price of about $1.80 per hundred pounds. That 100 pounds of potatoes contains 85 percent water. It contains only 15 percent solid matter.

In other words, the solid matter in 100 pounds of potatoes would

be somewhere around 15 pounds as compared to about 48 pounds of solid matter in a bushel of corn.

The composition of the solids of potatoes and corn is roughly the same. That is, both of them contain about 75 percent or 80 percent starch. Both of them contain about 6 or 8 percent protein. Corn contains about 5 percent fat. Potatoes contain about 3 percent fat. And they have minerals.

So just from the standpoint of the price which was set on potatoes in the price-support program, it was impossible to develop any economical feed or industrial use for potatoes. Potatoes do have certain advantages over corn for food purposes. That is due to their physical characteristics.

For instance, it is impossible to make something like mashed potatoes out of corn. So for food uses potatoes can command a much higher price than corn. But for feed uses and for industrial uses potatoes cannot command a higher price than corn.

At that time in our research efforts we did not even have information as to what was the cheapest way of drying potatoes for feed purposes. Primarily it was for feed purposes, surplus potatoes had the most promise. From the studies we have carried on it is apparent that the potatoes in surplus must be consumed right in the area where they are in surplus and, if possible, fed to animals because if they are transported for any distance, for 300 or 400 miles, the cost of transportation is prohibitive. The cost was so prohibitive that the Department had to give the potatoes away and even pay for the bags that were around the potatoes. So the Department lost money on this program.

But the best outlet or the cheapest outlet, the outlet which is the least costly, can be determined only by research. That is an extreme example, that is, the case of potatoes.

Mr. WHITTEN. Of course, being as aware of the cotton problem as I am, and the competitive situation with the various other synthetic fibers, I can appreciate that your Department is working on the problem and doing a good job on it. The question I have is largely directed to this, rather than that to which you have given us an answer. We provide a certain amount of money, and we try to have your work submitted to the review of commodity committees.

Dr. HILBERT. That is right.

Mr. WHITTEN. We hope they insist on directing your attention to the most acute problems, or those that offer the most hope for development.

Dr. HILBERT. That is done.

Mr. WHITTEN. We hope that we are putting the emphasis in the right place. I rather think we are.

Dr. HILBERT. Yes.

Mr. WHITTEN. The question is: On a comparative basis, is there about the right proportion of research compared with the action programs; or do you feel you are being crippled and that the need behind you is pressing on you a little harder? Of course, many problems you will not know about until they arise. That is a natural thing.

Dr. HILBERT. Yes.

Mr. WHITTEN. I am just trying to see whether we are maintaining a proper proportion of effort, and what your judgment is as to what changes we should make.

Dr. HILBERT. I do not think that there is a proper balance between the emphasis being devoted to research and the emphasis being devoted to the action programs. For example, just in the case of potatoes I indicated that the cost to the Government was $400 million. Well, the cost of research in the Department of Agriculture for the whole of 10 years, I believe, was less than $400 million.

Mr. HORAN. In that field it was very definitely less.

Dr. HILBERT. That was just one commodity, potatoes, on which we lost a tremendous amount of money. I think if there had been an adequate amount of research work a large part of that loss of the Government could have been avoided.

Mr. WHITTEN. Of course, I would have to say this: It was recognized by everybody that the potato program should not have been started where no control on production or limit on quantity existed. It was carried on years after everybody said it could not work. That does not refer to either political party, either. I was on this committee when we urged the Department to do something about it, and they in turn urged the Congress. The Democrats were in control. I was on this committee in the 80th Congress, when the Republicans were in control of the committee and of the Congress, and we urged that something be done. It was not done.

But I do think it was commonly understood that the potato program could not end up any place except where it did.

Dr. HILBERT. Yes. I can mention another one, concerning which we were extremely handicapped because we did not have the research information. That is the dried-egg program. I will go right back to the beginning of World War II on that, so that you can have the overall picture.

Mr. WHITTEN. I am glad to get this on the record, Doctor.

DRIED-EGG PROGRAM

Dr. HILBERT. Prior to World War II practically no work had been done on dried eggs in the United States. When World War II broke it was necessary to immediately start production of tremendous quantities of dried eggs, not only for the Army, but also to make them available to our allies. It was a nutritious protein food.

However, we did not have the research answers. We did not even know how to produce dried eggs in the right way. But because of the need and the urgency of producing as rapidly as possible, industry set up or was encouraged to produce dried eggs with very little knowledge of really how to produce them.

The amount of dried eggs produced in 1944, which was the peak of our dried-egg production, cost the Government $400 million, and the quantity of dried eggs produced was 320 million pounds. That was 20 percent of all the eggs produced in the United States.

In the meantime, we had initiated a research program in the early part of World War II, but we really did not catch up with production until the war ended. When the war ended, or just as the war was ending, we had found that the storage life of dehydrated eggs could be improved markedly, and the palatability could be improved markedly by a process we had developed.

Immediately after the war, when there was little need for dehydrated eggs, all of these companies closed down. The unfortunate

thing about it is that practically everybody in the United States, as well as the people in Europe, developed a very definite unfavorable reaction to dried eggs, because the quality had been so poor.

Mr. HUNTER. That was not confined to people in Europe.

Dr. HILBERT. No. I had some, too, and they were really very poor.

The unfortunate thing about it is: I think the eventual solution of the seasonal surplus-egg problem lies in the production of dried eggs. Now, we have a terrific job of carrying on an educational campaign to change the viewpoint of all of those people who had dried eggs during the war. One of the things we are doing now is, instead of calling the product dehydrated eggs, we call it egg solids. Egg solids, to me, seems to be a more desirable name.

Mr. WHITTEN. I raised the question the other day here as to whether the reason lard, or pork fat, did not sell was because of the attack on obesity. I wondered if the fact that so many of our people have a problem in holding down their weight, has not had an effect on the use of lard or fats, where it is known by that name. Back through the years that might be a deterrent toward the purchase or use of grease or lard.

Dr. HILBERT. In the last 2 or 3 or 4 years a campaign has been carried out in the United States to reduce obesity and pointing out the seriousness of obesity. As a result of that people feel that fat is one of the main contributing factors to obesity. It is not. The main contributing factor to obesity is carbohydrates. Actually, fats are very desirable from the standpoint of diet. There are a number of components in fats that are essential nutrients, and without fat the palatability of our food just drops tremendously. In other words, the food is more palatable, more tasty, if it has some fat in it. If you remove all the fat it does not have tastiness.

I think as a result of this campaign on obesity, and the fact that people have gotten the wrong impression about fats, that it has certainly cut down a lot of the intake of fats in the United States.

To get back to the problem of dried eggs: We developed a good method for producing them by the end of the war, but because we felt it would be impossible to introduce the process and encourage people in the United States to use dried eggs, we dropped all work on dried eggs until the Korean war started. Then the Army became interested. Since then we have developed another process which is much superior to the process we had developed at the end of World War II.

It is not a perfect product. From the standpoint of flavor and storage life it is very desirable in the form of scrambled eggs.

The dried-egg solids do not have the same physical characteristics, the whipping properties of the fresh eggs. That is a problem which must be solved before there will be extensive use by consumers and by commercial companies and large institutional users.

PROBLEMS IN SCHEDULING RESEARCH

Mr. WHITTEN. Doctor, you have given us two fine examples. The other side of what I am trying to point out is this: Those were two situations which arose. You were behind on the answers for the reasons you point out.

Now, we cannot hope to finance research to the point of having the answer to all things whenever the problems arise.

Dr. HILBERT. Yes.

Mr. WHITTEN. One of the weaknesses of these commodity committees is that they want you to spend your time entirely on problems which currently exist, and yet some of your effort should be looking down the road and recognizing problems before they arise.

Dr. HILBERT. That is right.

Mr. WHITTEN. And beating them to the punch.

Dr. HILBERT. That is right.

Mr. WHITTEN. What percentage of attention are we giving to solving these problems about as fast as they can be recognized? We realize that you cannot get enough money to find the answers to all things. Actually, until the problems arise we do not see the question sometimes.

Dr. HILBERT. Yes. Well, so far as urgent problems and problems that we are faced with right at the present time, or that we will be faced with within the next year, about 85 percent of all of our effort is devoted to those. So far as the long-term problems are concerned, problems that we will be confronted with 5 or 10 years from now, only about 15 percent of our effort is on those. The reason for it is because of the urgency of existing problems.

PROBLEMS IN SOYBEAN-MEAL PRODUCTION

For example, one came up a year ago which concerns the production of soybean meal, using trichloroethylene as a solvent. There were 12 small plants using trichloroethylene as a solvent for removing the oil from the soybeans. That process has been used for the last 5 years. The reason it was very desirable is because it was adapted to small companies. Trichloroethylene is nonflammable. Six of the 10 or 11 companies were cooperatives.

It was found suddenly that a strange new animal disease was breaking out in the United States. When they traced it down they found it was due to the soybean meal extracted by trichloroethylene. That is what it looked like [exhibiting picture].

This is a cow which has been eating trichloroethylene [exhibiting picture]. It is bleeding at the nostrils. It not only bled at the nostrils but it also had bloody stools.

Here is a picture of the stomach of the cow, which shows really hundreds of ulcers [exhibiting picture].

Mr. HORAN. What was this cow fed?

Dr. HILBERT. Soybean meal which had been extracted with trichloroethylene. These plants were immediately shut down and we immediately undertook research work to try to find out why that soybean meal was so toxic. We also let contracts with a number of State experiment stations to develop an assay method for measuring the toxicity of soybean meal.

Mr. HORAN. Is this the meal, Doctor?

Dr. HILBERT. That is the meal. These soybean-meal companies were rather widely scattered. Two of those plants were in Minnesota two were in Iowa; and there were plants in Illinios, Indiana, Ohio, Mississippi, and Delaware. In other words, they were widely scattered. All of those plants are closed down.

We are attempting to find out what is the toxic material, because if we know what the toxic material is then we can determine how to neutralize it in soybean meal and enable these companies to produce soybean meal using a nonflammable solvent. That is what I call an urgent problem.

We reduced other work—for instance, on the flavor stability of soybean oil—in order to hit this problem hard and solve it as fast as possible. There is one problem that goes directly back to the farmer. That is a short-term problem.

ACETYLATED COTTON

With respect to the balance of our program, with respect to attempting to retain uses for commodities, I can refer to one in the field of cotton, on which we have been working for quite some time. It has been 7 years from the time we started our laboratory studies, and it was not until this last year that the process we had developed was taken up by industry, by three companies.

That concerns acetylated cotton. In those uses which go into the household or for apparel, cotton has been able to hold its own. Its consumption has followed the population rise. But in the field of industrial uses cotton has been losing out.

I can give you a good example in the field of the laundry industry. In the laundry industry about 134,000 bales of cotton have been used for pads, padding, and covers. This is what the trend over the years has been [exhibiting document].

Mr. HORAN. Could we insert that in the record at this point, Dr. Hilbert?

Dr. HILBERT. I would be happy to do so.

(The document referred to is as follows:)

Cotton and competing fibers in the laundry industry

Year	Yearly consumption		
	Cotton		Other fibers (million pounds)
	Thousand bales	Million pounds	
1940	134	67.0	----------
1945	143	71.5	2.5
1951	107	53.5	33.0

Laundry press covers

	Current price per dozen	Service life, weeks	Average cost of operation per week
Untreated cotton	$9	1	$9
Acetylated cotton	21	4–6	4
Untreated nylon	21	2–3	8
Resin-treated nylon	41	4–6	8

Dr. HILBERT. I thought you might like to look at these charts.

Mr. HORAN. This is the type of thing we like to have in the record.

Dr. HILBERT. This table shows the quantity of cotton used in the laundry industry and the effect of competing fibers.

As shown in the top table, in 1940 there were 134,000 bales of cotton used, which amounted to 67 million pounds; and there were no other fibers.

In 1945 the amount of cotton which was used had increased to 143,000 bales, and the synthetic fibers for the first time started to enter the field. There were 2.5 million pounds of other fibers used.

In 1951 cotton very definitely was losing out. The amount of cotton consumed was 107,000 bales, or 53.5 million pounds; and there were 33 million pounds of synthetic fibers used, also.

Now let us look at the cost figures which are shown in that second table. In the case of untreated cotton the price of laundry covers was $9 per dozen. The service life is 1 week. The average cost of the operation per week is $9.

The service life of only 1 week is due to the poor heat resistance of cotton. Acetylated cotton, which we developed in the Southern Laboratory, and which is now being produced by 3 industrial companies, can be made for $21 per dozen. Its service life is from 4 to 6 weeks. The average cost of the cover per week drops to $4.

In the last 2 years nylon has been used for this purpose. Nylon costs the same as acetylated cotton, but it has only half the service life.

In the case of resin-treated nylon, it costs twice as much as acetylated cotton, and has a service life no greater than that of acetylated cotton.

Nylon has been gradually taking over the uses of cotton, in the last 2 or 3 years, but this acetylated cotton I think will replace nylon and hold the market for cotton in the laundry trade.

Mr. HORAN. I notice it has the expected life of nylon and costs about half as much.

Dr. HILBERT. That is right.

Mr. WHITTEN. Doctor, that is a wonderful story. Again, about 15 percent of your effort is directed down the road, or for pure research. And that is about as much as can be well spent, is it not? The old statement about necessity being the mother of invention still applies to a considerable extent, does it not? The need has to arise before a sufficient effort can be made or will be made to meet it, with some exceptions.

Dr. HILBERT. Sometimes some of these problems can be foreseen. For instance, it has been known for quite some time that cotton has been losing out in the industrial field.

COTTON TIRE CORD

For example, take cotton tire cord. Prior to World War II in the neighborhood of 750,000 bales of cotton were used in the cotton tire cord. Now it has dropped down to about 200,000 bales.

But that is the general picture of cotton for all industrial uses. One way to stop this trend is by modifying cotton so as to eliminate those unfavorable properties. We know what those unfavorable properties are.

When you talk about the cost of research we have devoted in this field, most of our emphasis has been on acetylated cotton, but acetylated cotton is only one new type of cotton fiber that can be made. It is not the only one. There are thousands of chemically modified cottons that can be made that will have different properties than acetylated cotton and cotton, and different properties than the synthetic fibers.

It is impossible for us to carry out even a fraction of the effort needed in developing these new fibers. To develop a new fiber like this takes a tremendous amount of effort. I have indicated that we have been working on this particular problem for 7 years, gradually increasing our efforts as it became more and more promising. Within the last year or two we have been increasing, because we felt we were practically over the hump, and we have had 20 to 25 men working on this problem in order to solve it as rapidly as possible.

We have been working on three other new types of chemically modified fibers, which have a great deal of promise. Those are still in the laboratory scale. We have not even gone up to the pilot-plant scale.

SELECTED EXAMPLES OF ACHIEVEMENTS—ESTIMATED COSTS AND ESTIMATED VALUES

Mr. WHITTEN. Mr. Chairman, last year I asked the Department to compare the cost of some of these discoveries in dollars and cents with the dollars and cents of savings by reason of the discoveries. I also asked for a comparison showing the comparative cost of some of this research with some of the expenditures we are making in a military way. It is not that we can do away with national defense; but it does give the Congress and the people some guidepost by which they can judge the results we get from the money expended for research in the Department of Agriculture.

Mr. HORAN. I think it would be well to place the information in the record this year. Can you prepare that, Dr. Hilbert?

Dr. HILBERT. Yes.

(The material requested is as follows:)

SELECTED EXAMPLES OF ACHIEVEMENTS OF BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY SHOWING ESTIMATED COST OF BUREAU RESEARCH COMPARED WITH ESTIMATED VALUE OF ACHIEVEMENT

Froth-flotation cleaning of vegetables

A process was developed by the Bureau employing the principle of froth flotation for removal of hulls, damaged kernels, nightshade berries and other debris in commercial processing of peas, sweet corn, lima beans, and black-eyed peas. The process not only reduces processing costs significantly, but makes it possible to process products that could not economically be handled by hand labor. The estimated cost (salaries and expenses) to the Federal Government was $21,000.

Its value to the industry is estimated now at more than $1 million per year and this will be doubled as additional units are installed.

Riboflavin

A new fermentation method for making riboflavin, a vitamin indispensable in feeds, was developed by the Bureau using agricultural materials such as corn sugar, steep liquor, etc. Four public-service patents have been issued to the Bureau on this development. The estimated cost (salaries and expenses) to the Federal Government was $215,000.

Five companies are employing the process with an estimated annual production of 106,000 pounds, having a wholesale value of $4,800,000.

Naval stores

Central pine-gum processing plants for production of gum turpentine and gum rosin were based on Bureau research. The estimated cost (salaries and expenses) to the Federal Government was $237,000. Results are covered by seven public-service patents issued to the Bureau.

It has been estimated that the pine-gum farmers receive at least $1 million a year more for crude pine gum due to this development.

Penicillin

From a survey of thousands of mold strains collected from all over the world, the Bureau discovered a high-yielding strain which led to a hundredfold increase in the yield of penicillin. A highly productive culture medium, utilizing agricultural commodities, was developed by the Bureau which received universal acceptance. To make production of the drug practical commercially, a submerged type culturing was developed by the Bureau so that large quantities could be produced and at a low cost. As a result of this work, penicillin was converted in a remarkably short period from a laboratory curiosity to commercial reality and was of incalculable value in treating casualties in World War II. Since then it has practically removed pneumonia and a number of other diseases from the serious category. The methods developed for penicillin manufacture have set the pattern for other antibiotics. The estimated cost (salaries and expenses) to the Federal Government was $100,000. The results are covered by nine public-service patents issued to the Bureau.

The estimated current commercial value of penicillin is $150 million annually.

Vitamin B_{12}

A new fermentation method for making vitamin B_{12}, an indispensable factor inadequate in many feedstuffs, was developed. The process uses agricultural materials, such as corn sugar, distillers' solubles and soy meal as starting material. The use of vitamin B_{12} in farm rations results in more rapid growth and higher feed efficiency. One public-service patent has been issued to the Bureau on this process, with a second patent pending. Estimated cost (salaries and expenses) to the Federal Government was $150,000.

At least 5 companies are employing the Bureau's process to produce 198 pounds (pure vitamin basis) annually, with a wholesale value of $6 million.

Frozen orange-juice concentrate

In cooperation with the Florida Citrus Commission, the Bureau developed a successful process for preparation of orange-juice concentrate without loss of flavor. The remarkable acceptance of this new frozen food by the public has resulted in a substantial increase in consumption of oranges and it is noteworthy that no surplus has developed in this healthy agricultural industry. The development is covered in a public-service patent issued to the Bureau. The estimated cost (salaries and expenses) to the Federal Government was $70,000.

Within the past year, over 43 million gallons of frozen orange-juice concentrate were sold in the retail market. The purchase price is estimated at $156 million.

Plasticizer from animal fats

A new type of chemical, made from animal fats by a special type of oxidation has been developed by the Bureau and is finding extensive use by the plastics industry for the softening (plasticizing) of vinyl plastics. The new plasticizer has advantages over competing products in that it produces and maintains desirable properties in vinyl plastic products. It will also constitute a sizable outlet for low-priced inedible animal fats currently in surplus. The new plasticizer is covered by two public-service patents issued to the Bureau and the cost (salaries and expenses) to the Federal Government of the research to date is estimated to be $100,000.

Three large companies are now producing the new plasticizer and ultimate production is estimated to be 150 million pounds annually with a commercial value of $60 million. At this level of production, approximately 150 million pounds of fat would be consumed each year.

High-purity oleic acid from animal fats

The Bureau has developed a process for preparing oleic acid of high purity from animal fats, making available a new industrial chemical raw material for new product development and providing a substantial outlet for inedible animal fats now available in surplus. The results of this research are covered by a public-service patent issued to the Bureau and the cost (salaries and expenses) to the Federal Government is estimated to be $60,000.

The Bureau's process has been adopted by several of the world's largest producers of fatty acids and has resulted in current consumption of approximately 20 million pounds of animal fats annually for this purpose. The industrial value of the high-purity oleic acid produced is estimated to be $3 million annually with the expectation that continuing development of additional uses for high-purity oleic acid, now that it is available, will further boost this production, within the next 10 years, to 100 million pounds annually valued at $15 million.

Zein fibers

Basic investigations in this Bureau on the preparation and stability of alkaline solutions of zein (corn protein) and development of a continuous process for producing from these solutions textile fibers having high strength, stability and excellent dyeing and printing qualities has led to the establishment of an expanding industry for manufacturing this fiber. Three public-service patents have been issued to the Bureau on this work. Estimated cost (salaries and expenses) to the Federal Government is $105,000.

Industrial production of zein fiber is estimated at 8 million pounds per year with an estimated commercial value of $10 milliom.

Flavor stabilization of soybean oil

Basic investigations in the Bureau on soybean oil have shown that traces of iron and other metals in the oil hasten the development of the off-flavors that make the oil less suitable than competitive oils for certain food uses. The Bureau has discovered chemical compounds and procedures for adding these compounds to soybean oil to inactivate these metals and thus retard the development of off-flavors. The results of this research are covered by five public-service patents pending and issued to the Bureau and the cost (salaries and expenses) to the Federal Government to date is estimated to be $570,000.

More than 90 percent of the soybean oil produced is protected against metal contamination by the Bureau-developed procedure. The value of this treatment amounts to at least one-tenth of a cent per pound of soybean oil processed, or an estimated $1,800,000 in 1952.

Dextran, a blood-volume expander

A new bacterium was discovered by the Bureau which has proved most suitable in this country for the production, from agricultural materials, of the carbohydrate dextran, needed as a blood-volume expander. All companies making clinical dextran for our military and civilian use employ this bacterium. In addition, laboratory and pilot-plant production and processing conditions were developed by the Bureau to make possible the establishment of this totally new industry. When this research was initiated only imported dextran was available at a price of $14 a bottle. Now, as a result of improved processing, an improved product is being produced at less than half that price. Further savings in production cost are expected to result from research now in progress. The results of this research are covered by 11 public-service patents pending or issued to the Bureau and the cost (salaries and expenses) to the Federal Government to date is estimated to be $800,000.

Four companies, with a capital investment of about $4 million, are producing about 3,000,000 bottles (dosage units) of dextran solution annually, having an approximate value of $20,000,000.

Pear-waste utilization

Development of means, in cooperation with a large industrial association, for manufacturing a valuable livestock feed from cores and skins of pears makes it possible to change a costly waste-disposal operation into one showing a profit. Increasing pressure from water pollution and health authorities made solution of this problem mandatory. Cost to the Federal Government (salaries and expenses) is estimated at $70,000, and a public-service patent covering the process has been issued to the Bureau.

This development is being tested industrially on a large pilot-plant scale in an area producing about one-third of the national pack of pears. Results indicate that full-scale adoption of the process will be worth $400,000 annually in this area alone.

Conforming cotton bandage

A new type of semielastic, rubberless cotton bandage developed in the Bureau is being produced commercially and has been adopted for procurement by the Armed Forces at a cost of less than one-half that of the conventional elastic bandage previously used.

The outstanding feature of this new bandage is its ready adaptability to irregular contours of the body. Results of this research are covered by a public-service patent issued to the Bureau. The estimated cost of research (salaries and expenses) to the Federal Government is $75,000.

As a result of this development, a saving of about $5 million has been realized so far on orders placed by the Armed Forces alone.

Soft grits for blast cleaning

The Bureau has developed a procedure, known as soft grit blasting, which utilizes ground corncobs for cleaning the surface of metals in aircraft and automobile engines, motors, machinery, etc. One public-service patent has been issued to the Bureau covering results of this research. The cost (salaries and expenses) of this research to the Federal Government is estimated to be $15,000.

Largely as a result of Bureau work in this field the corncob-grinding industry has expanded from 1 plant in 1939 to about 25 plants in 1952. An estimated 600,000 tons of corncobs were ground in 1952 to sell at $35–$50 per ton, or a total value of approximately $24 million.

Cotton opener

A new machine has been developed by the Bureau to open baled cotton in the textile mills and rapidly convert it to a loose, fluffy condition suitable for processing into yarns and fabrics. Results of this research are covered by five public-service patents pending or issued to the Bureau. Estimated cost of the research (salaries and expenses) to the Federal Government is $200,000.

The opener has been in commercial use two seasons. At least 3 firms are producing it and at least 10 mills already are using it with an estimated saving ranging from 50 cents to $2 per bale processed. Potentially the opener appears most valuable in processing the lower grades of cotton (strict lowmiddling and lower) which comprise almost half of the 10 million bales processed annually.

Partially acetylated cotton

The Bureau has developed a new chemical treatment which renders cotton much more resistant to deterioration by heat and rotting. The cost (salaries and expenses) of this research to the Federal Government is estimated to be $150,000 to date.

In the laundry-fabric market alone, where vastly increased heat resistance will enable cotton to maintain its competitive position, the annual potential value of the cotton used is approximately $4 million. Markets in which rot and weathering resistance are important use several times this amount of cotton. At least three firms have adopted this process commercially during the past year and now are producing partially acetylated cottons.

Improvement of dried-egg products

The Bureau's research on eggs has contributed significantly through advances of scientific knowledge and the development of technological improvement to the production of wholly acceptable dried-egg products and the establishment of a great and continually expanding industry. The improvements were in the production of standard whole-egg powder, acidified whole-egg powder, glucose-free whole-egg powder, glucose-free yolk powder, sugar-dried whole-egg powder, and improved dried-egg albumen. The results of this research are covered by four public-service patents and the cost (salaries and expenses) to the Federal Government to date is estimated to be $500,000.

The industrial value of dried-egg products from 1942 to date, during which period the Bureau has been engaged in research in this field, is approximately $1 billion. Current production of all dried-egg products is approximately 17 million pounds annually with a wholesale value of $20,000,000. The availability of a process for producing highly palatable stable dried-egg solids can be expected to play a leading role in the solution of the recurring seasonal surplus problem.

Improvements in synthetic rubber processing

The Bureau discovered that certain components of soaps made from animal fats and used as emulsifiers in synthetic rubber production tended to slow the process seriously. This was followed by a development by the Bureau of means for estimating the amounts of the offending components present and for their elimination. This research cost (salaries and expenses) the Federal Government an estimated $40,000.

The improved soaps made possible an increase in the yield of synthetic rubber from 800,000 to 1,000,000 tons a year with the same plant facilities, and a 50-

percent reduction in the production time. The value of the increased synthetic rubber production made possible thereby amounted to $10,000,000. Currently, some 30,000,000 pounds of inedible animal fats, valued at $1,200,000, are being converted annually to soaps for this purpose.

ORANGE-JUICE POWDER

Mr. HUNTER. Before I ask any questions about this orange-juice powder, I think I had better take it home and try it. Is it advisable to aerate it, like you do the frozen type?

Dr. HILBERT. I think if you just stir it rapidly you will get enough air into it.

Mr. HUNTER. Is this on the market yet?

Dr. HILBERT. This is not on the market. We finished our experiments, producing this particular lot, just about a year ago, and after we produced the lot we had to carry on the 6 months' storage studies at 100° Fahrenheit. The reason we carry on the 6 months' storage studies at 100° Fahrenheit is because that is the requirement of the Army, that foods be stable at that high temperature for 6 months.

Sufficient material was turned over to the Quartermaster Corps, Department of Defense, so that they could carry out their own experiments. When the 6 months' period was over the Department of Defense agreed with us that this was an extremely desirable product from the standpoint of the military, because of its palatability, the saving of metal, the saving of storage space, and the general logistic problem of the Department of Defense. They immediately financed semicommercial production of orange powder for more thorough tests so that they can make the material available for large-scale tests in the Navy, Air Force, and other units. That is the present stage of the development. It has been carried on through the semicommercial scale, but it is not being produced commercially at the present time.

I might point out that the very fact that the Quartermaster Corps is interested is very helpful from the standpoint of the Department of Agriculture. If the Department of Defense were not interested industry might be reluctant to produce it, because of plant-investment requirements, such as evaporators, and the concern about a market. But the Department of Defense very definitely has a market. Once it is produced for the Department of Defense and all the production bugs in the process are ironed out civilian markets are likely to develop.

Mr. HUNTER. In your opinion, Doctor, is it economically feasible from a marketing standpoint? For example, it is now proved that the sale of orange juice in frozen concentrate form is definitely economically feasible. As a matter of fact, it has increased the use of orange juice in the domestic market tremendously. Do you look forward to the same sort of results with the orange powder?

Dr. HILBERT. I think this is one of the most important developments that has come out of the Bureau in a long time; that is, on the overall impact it may have on agriculture.

Mr. HUNTER. I know that representatives of the citrus industry in California have high hopes for this particular field of development.

Dr. HILBERT. Yes. They are very keenly interested in this. The California citrus industry and the Florida citrus industry are very interested.

We have carried on cost-estimate studies, and savings are made in the tin cans and the fact that it does not have to be stored in refrigerated warehouses, does not have to be shipped in a refrigerated car, and does not have to be held in the retail store in a refrigerated space. These savings will tend to just about balance the extra cost of more processing. It may be slightly more expensive than frozen orange concentrate but it will take further developmental work to find out.

Mr. HUNTER. It makes possible the consumption of orange juice in places where otherwise it would not be possible.

Dr. HILBERT. That is right. Certainly in Europe or those places of the United States—if there are any left—where they have no refrigeration facilities this would be of great value.

The reason I say that this may be one of the most important developments which has come out of the Bureau is because this process is applicable to other products; that is to other fruit juices, and to vegetables. We have just made one run on tomato powder from the standpoint of patent coverage. We get a very fine product from tomato powder.

TOMATO POWDER

Just to show you how important that is as far as our agriculture is concerned, the cost of shipping tomato juice in No. 10 cans, that is the cost of the can, the carton, and of transportation, is 40 percent of the wholesale price of the juice in New York, if it is shipped from the west coast. In other words, it costs 32 cents to ship a gallon of tomato juice and pay for all the containers. If the tomato powder were shipped in this form it would cost 4 cents instead of 32 cents. That shows you the tremendous saving that can be made.

The palatability and the storage life of the powder is excellent.

Mr. HUNTER. You are speaking now of tomato juice?

Dr. HILBERT. Well, the same probably holds true for orange juice. I think the cost would be the same.

Mr. HUNTER. You mentioned the palatability, however. Are you referring to tomato juice or orange juice?

Dr. HILBERT. Both of them.

Mr. HUNTER. Both.

Dr. HILBERT. Yes. The reason I mentioned it is that I do happen to know the cost figures on tomato juice. I do not happen to know the figures on orange juice, but I think they are comparable.

Mr. HUNTER. You believe this same process can perhaps be well applied to many other kinds of vegetable juices?

Dr. HILBERT. We think it can. We however have done no work on that. It obviously is a problem which should be hit hard over the next year or so. As a matter of fact, in one of the increases we are requesting, a large part of the increase would be used to apply this process to other fruits and other vegetables.

DRIED EGGS

Mr. HUNTER. Getting back to the discussion of dried eggs, I hope that in the development of that program someone will take the responsibility for getting across to the people how to prepare them. The preparation of scrambled eggs from powder by the military services has often been less than satisfactory. I know that from my own experience.

Dr. HILBERT. That is right.

Mr. HUNTER. As a matter of fact, even in World War II, if the material was properly prepared it was not too bad.

Dr. HILBERT. Yes.

Mr. HUNTER. I think that is really part of the problem and part of the program, that is, to see that they are properly used. Otherwise they will remain unsatisfactory so far as consumers are concerned.

Dr. HILBERT. That was one of the important factors, the fact that they were mishandled by the cooks.

Of course, quality varied enormously, depending upon how long the dried eggs had been stored. If you got a relatively freshly processed product it was quite good. If it had been stored for any length of time, it began to take on the flavor of rotten eggs.

But the product which can be prepared now, even with mishandling on the part of the cook, if it is used in the form of scrambled eggs, is very good. I do not think you can distinguish it from fresh eggs. I turned over a sample of that to the committee last year. I do not know whether you had an opportunity to try it.

Mr. HORAN. I did. It was very good.

Dr. HILBERT. Yes.

VEGETABLE OILS

Mr. HUNTER. I have one other question, Doctor. This concerns the vegetable oils, particularly cottonseed oil and soy bean oil. Are these two oils interchangeable so far as use in domestic products is concerned?

Dr. HILBERT. For most uses vegetable oils are interchangeable. They are also interchangeable with lard, particularly after they are treated and converted into shortening.

Soybean oil, for some uses, industrial uses, is more desirable than cottonseed oil. For example, in making paints soybean oil is a very good adjunct. Cottonseed oil is not.

On the other hand, cottonseed oil has an advantage in that it is more stable. It will not turn rancid as rapidly as soybean oil. Really, the biggest problem in the soybean oil industry is the development of methods for increasing storage life of soybean oil, so that it will not develop off-flavor. The off-flavor that develops in the case of soybean oil is sometimes referred to as a painty flavor or a rancid flavor.

For food uses the oils are interchangeable.

Mr. HUNTER. When you were speaking about potatoes, you pointed out one of the troubles you had was that of economics. That is, so many dollars worth of potatoes produced much less in value in the way of certain byproducts than were produced from an equal number of dollars worth of corn. I think we may be running into trouble in the future if we have not done so already, as between soybeans and cottonseed. I do not know whether you have any figures on this or not, but I would be interested in knowing whether, when you support cottonseed at 90 percent of parity and also support soybeans at 90 percent of parity the end products are not cheaper if they are made out of soybeans? I am wondering about whether we may price cottonseed out of the market by such action.

Dr. HILBERT. That can very well happen. I do not have those figures, but from the information that has been developed considera-

tion should be given in setting price supports to intercommodity competition. We know what the value of the oil and the meal is in both cases. I think that is a point that has to be watched very carefully, because that could easily happen.

Mr. HUNTER. We can under certain conditions prevent imports of competitive products, but we cannot very well prevent competition within the country.

Dr. HILBERT. Yes.

Mr. HUNTER. If there are farmers who want to produce soybeans and there is a market for them, from the standpoint of economics it is just something that has to be.

That is all.

COOPERATION WITH DEPARTMENT OF DEFENSE

Mr. LAIRD. Doctor, I noticed in your supporting statements here that you have been doing quite a little work for the Department of Defense. Do you get quite a few requests from the Defense Department for work?

Dr. HILBERT. Yes, we have. We set up a plan of very close cooperation when the Korean war started out. We can give you a picture of approximately how close the cooperation is when I say that just from the standpoint of communications, exchange of letters, there have been 600 in the past year.

So far as visitations are concerned, the visitations have amounted to about 100, where men from the regional laboratories or the Bureau visit various agencies of the Department of Defense, and where people of the Department of Defense visit us. Those visitations concern problems in which we are mutually interested.

Mr. LAIRD. You do have a lot of work for them, then?

Dr. HILBERT. That is right.

Mr. LAIRD. If you have a project under way and they come over with a request to you to develop some other project or to work on some other project which they think is of greater importance to them, and which, perhaps, is not of as great an importance to the industry concerned, do you give their project priority?

Dr. HILBERT. We do not give them priority. We try, wherever possible, when the interests of agriculture and the interests of the Department of Defense are the same, to carry out that work using our own funds. When the Department of Defense comes to us with a problem which, so far as agriculture is concerned, is a long-term problem, then we will work on if it the Department of Defense supplies working funds.

Mr. LAIRD. All of your work is done, then, with Department of Defense funds, on their request?

Dr. HILBERT. No. For instance, on the work that is done on dried eggs, that is done on our own initiative because I feel that we should be doing work on dried eggs. We should be doing as much work on it as is possible, because it is of direct value to agriculture as well as the Department of Defense. But if the Department of Defense should request us, for example, to study the theory of flameproofing cotton, which is a long-term problem in which we are interested but which is not urgent and the results may be intangible then the Department of Defense supports that work.

Mr. LAIRD. Then there are cases where you are doing work at their

request which is done with the Department of Agriculture funds?

Dr. HILBERT. That is right.

Mr. LAIRD. I have no further questions.

Mr. WHITTEN. Mr Chairman, May I suggest that the committee give consideration with regard to moneys expended by the Department of Agriculture for and on behalf of work projects for other departments, to setting them up separately in our report.

Mr. HORAN. I think we should. The only way we can keep track of what we are doing is by knowing all of these transfers and allotments. I assume they are all set out here in your justifications.

Mr. LAIRD. I think Mr. Whitten's suggestion is a good one for the purpose of informing the committee.

Mr. WHITTEN. Each department seems to have an appropriation for research and the funds are transferred around to other agencies. For instance, the Bureau of Standards, as Mr. Horan has pointed out, gets money from various agencies: and we are confronted with the difficulty of keeping up with what is going on.

Mr. HORAN. How much better it would be if we could show all the funds in one basket. It cannot be worked that way, but it does complicate the work of trying to understand its relationship to the things that are being done.

REDUCTION OF SURPLUSES THROUGH THE DEHYDRATION AND CONCENTRATION OF FOODS

Mr. MARSHALL. Dr. Hilbert, in your opening statement you spoke about improvements that are made in the processing of dehydrated foods.

Dr. HILBERT. Yes.

Mr. MARSHALL. You also spoke of the opportunity for making and storing dehydrated foods for civilian consumption.

Dr. HILBERT. Yes.

Mr. MARSHALL. One of the problems that the consumers of the future are going to be faced with will be one of maintaining an adequate diet. I think every bit of the testimony before this committee has pointed to the fact that with the increase in population, we are going to have a problem of maintaining an adequate food supply at a price which the consumer can afford to pay.

Dr. HILBERT. Yes.

Mr. MARSHALL. Now, my question is this: Do you feel that it is advisable for your department to be carrying on research pointed in that direction?

Dr. HILBERT. On the dehydration and concentration of foods?

Mr. MARSHALL. That is right; for storage purposes.

Dr. HILBERT. That is correct. As a matter of fact, the necessity for the program is based on that thesis, based on the thesis of getting that result and reducing processing costs, the cost of storage, maintaining palatability, as well as producing the food in a form that the housewife can conveniently use.

Dehydrated potatoes is a good example: The seasonable surplus problem of potatoes in the future will be solved by the development of an economical method of producing dehydrated potatoes having a long storage life and excellent palatability.

I think that the decrease in the consumption of potatoes largely has been due to the inconvenience which the housewife has in preparing potatoes for eating purposes. She has to boil them, and after boiling them has to mix them up with milk and butter to make mashed potatoes. But with the dehydrated potatoes, it is possible just by adding milk and stirring them up, to have mashed potatoes within 5 to 10 minutes. Now she has to take as much as 2 hours to produce mashed potatoes.

Mr. MARSHALL. I am glad to hear you make that statement. We have some phases of the agricultural program that has been highly publicized unfavorably, such as the potato program.

Dr. HILBERT. Yes.

Mr. MARSHALL. Which in the support-price program was only a part of the answer as far as both the consumer and the producer were concerned.

Dr. HILBERT. Yes.

Mr. MARSHALL. Certainly the support price on potatoes was an expensive one to the taxpayers; since he was not given any opportunity to protect himself against that sort of economics, based upon purely supply and demand.

Dr. HILBERT. Yes.

Mr. MARSHALL. We have had some fortunate years in production in this country.

Dr. HILBERT. Yes.

Mr. MARSHALL. And in those years we have not always faced up to what might happen to the consumers of this country, were we to come up against some shortages. We have had periodic shortages to some extent, and we have had them in connection with some of the drought areas in the West and Southwest, and we may be coming to it in connection with the wheat harvest this year.

Dr. HILBERT. Yes.

Mr. MARSHALL. And every time we have one of these shortages it emphasizes the necessity that we have a program to provide for adequate reserves for consumers, so as to give them protection.

Dr. HILBERT. Yes. For instance, 2 years ago there was a shortage of potatoes. Potatoes were costing so much that the consumer could hardly afford to buy them. But in seasons when we do have a surplus, if the product can be converted to a palatable, stable form, then I think it would tend to level off these periodic surplus-production seasons to help meet the deficit-production years.

Mention was made of the process of concentrated orange juice: I think that is an excellent example of how you can solve a surplus problem. For example, back in 1945 there was serious concern of the surplus of citrus fruits. That was just about when concentrated orange juice was produced. The production of concentrated orange juice has been doubled practically every year. This past year actually more orange juice is being converted to frozen concentrated orange juice than is being canned, and eaten as the fresh fruit. That, of course, has brought citrus fruit, the price of citrus juice down to a level where the consumer can afford to buy it in increasing quantities, and at the same time the farmer is getting an excellent return. There has been no concern that I know of in the last 5 years about there being a surplus crop of citrus fruit. That has been due primarily to the proc-

ess of concentrating orange juice; that is, the development of a process for converting it to a palatable, stable form of food.

I think the same thing can be done with respect to other perishable commodities.

RESEARCH CONTRACTS

Mr. HORAN. Dr. Hilbert, there are some requested increases in your justifications, which we would like to have you go into a little more fully. Explain where you are employing contractual relationships, and if not, why the Bureau has to do the work, and if the Bureau has to do it, how many more jobs will be involved.

Dr. HILBERT. In each of the past 2 or 3 years approximately $450,000 of the Bureau's funds have been diverted to contracts—and I can give you the exact number of the contracts, if you wish.

Mr. HORAN. Yes.

Dr. HILBERT. One hundred contracts have been let since 1948.

Mr. HORAN. I think it would be helpful if you would supply the committee with a statement showing the nature of work done under those contracts and who the contractors are.

(The information requested follows:)

Research contracts negotiated under the contracting authority of the Research and Marketing Act of 1946

Subject	Contractor	Contract price
FISCAL YEAR 1948		
Staling in bakery products [1]	American Institute of Baking	$20,000
Improved instrument for tensile strength measurement on cotton fiber	University of Tennessee	20,750
Control of neps in cotton textiles	University of North Carolina	60,000
Improved cotton warp yarns for carpets	Lowell Textile Institute	71,500
Measuring raw stock maturity of peas	Utah Agricultural Experiment Station	13,250
Dehydration of sugar-beet tops	Colorado Agricultural Experiment Station	47,500
Commercial-scale dehydration of vegetable wastes for feedstuffs.	Seabrook Farming Corp	60,000
Adaptation of cotton yarns for tricot knitting machines.	University of North Carolina	45,500
Solvent extraction of cottonseed prior to separating linters and hulls.	Cotton Research Committee of Texas	14,250
Increasing soil resistance of cotton textiles	Institute of Textile Technology	55,000
Flavor stability of soybean oil, fundamental studies.	University of Pittsburgh	17,500
Press for continuous recovery of pear-waste juice	U. S. Die Casting & Manufacturing Co	40,000
Pathogenicity for humans of Salmonella organisms from dried eggs.	University of Chicago	37,069
Total, fiscal year 1948		502,319
FISCAL YEAR 1949		
Staling in bakery products [2]	American Institute of Baking	15,000
Draping properties of cotton fabrics	Fabric Research Laboratories	58,000
Effect of time and storage of wools on quality of worsted fabrics.	Textile Research Institute Laboratories	75,000
Hydraulic pressing of cottonseed	University of Tennessee	20,000
Effect of alcohol-water injection on lubricating oils	Armour Research Foundation	12,000
Measuring "drag" of cotton fiber	Institute of Textile Technology	8,000
Total, fiscal year 1949		188,000
FISCAL YEAR 1950		
Staling in bakery products [3]	American Institute of Baking	15,000
Pilot-plant study of effect of drying, storage, and processing on rice quality.	University of Arkansas	39,402
Improving luster of cotton textiles	Harris Research Laboratories	59,000
Processing of eastern freestone peaches	Michigan Agricultural Experiment Station.	14,196

[1] Supplements to this contract were executed in fiscal years 1949 and 1950.
[2] Supplement No. 1 to contract executed in fiscal year 1948.
[3] Supplement No. 2 to contract executed in fiscal year 1948.

Research contracts negotiated under the contracting authority of the Research and Marketing Act of 1946—Continued

Subject	Contractor	Contract price
FISCAL YEAR 1950—continued		
Continuous screw pressing of cottonseed	Cottonseed Products Research Laboratory (Texas Agricultural Experiment Station).	$29,650
Aliphatic esters of p-toluene sulfonic acid	Tulane University of Louisiana	5,000
Flavor principles from isolinoleic acid	University of Pittsburgh	17,500
Honey in bakery products	Kansas Agricultural Experiment Station	8,821
Antiviral action of antibiotics	Stanford University	20,000
Palm oil substitute for hot dip tinning	Armour Research Foundation of Illinois Institute of Technology.	20,471
Use of stabilized fats in prepared feeds	American Meat Institute Foundation	38,136
Composition of final sugarcane molasses	Ohio State University Research Foundation.	20,000
Contamination of poultry products with food poisoning organisms (Salmonella, etc.)	University of Nebraska	17,000
Survey of research on animal fats	John W. McCutcheon, consulting chemist	7,860
Functional properties of eggs subjected to commercial processing and storage treatments.	Iowa State College	10,000
Plant-scale research on utilization of cereal grains for alcohol production (fungal amylase).	Grain Processing Corp	25,000
Improvement of processed sour cherries	Michigan Agricultural Experiment Station.	9,489
Effect of conditions in sugarcane milling on yield and quality of cane sugar.	Louisiana State University	7,012
Total, fiscal year 1950		363,537
FISCAL YEAR 1951		
Farm tractor tests with alcohol-water injection	Ohio Agricultural Experiment Station	27,842
Composition of water-soluble carbohydrates in wheat flour and bread.	University of Minnesota Agricultural Experiment Station.	20,000
Fungal amylase conversion of damaged grains into alcohol.	Grain Processing Corp	30,000
Animal feeding tests on fermentation products	Michigan State College	6,300
Preprocessing alfalfa before dehydration to preserve carotene content.	Arizona Agricultural Experiment Station	23,667
Electrostatic forces in processing cotton	Clemson Agricultural College	19,822
Measuring napping potential of lint cotton	University of North Carolina	19,971
Improved dry cleaning of cotton textiles	Institute of Textile Technology	20,043
Improvement of dried prune manufacture	University of California	39,951
Processing of tropical fruits	University of Hawaii	39,000
Color stabilization in strawberry preserves	University of California	9,975
Influence of processing methods on food utilization of cottonseed meal.	Oklahoma Agricultural and Mechanical College.	20,117
Volatile conjugated oxidative products from linolenic esters.	University of Illinois	20,000
Anti-soybean-growth inhibitor	Nebraska Agricultural Experiment Station.	18,500
Dry honey-skim milk in baking mixes	Doughnut Corp. of America	7,674
Microbiological methods for study of Salmonella in eggs.	Agricultural Experiment Station of Iowa State College of Agriculture and Mechanic Arts.	29,112
Vacuum distillation of fatty acids	Pennsylvania State College	35,000
Vinyl esters and ethers of fatty acids	General Aniline & Film Corp	19,021
Effect of alcohol-water injection with leaded and sulfur-containing fuels on lubricating oils.	Southwest Research Institute	25,560
Use of Gelsoy as aerating agent	Food Technology, Inc	7,500
Fungal amylase conversion of corn into alcohol	Grain Processing Corp	20,000
Total, fiscal year 1951		459,055
FISCAL YEAR 1952		
Alcohol-water injection to prevent valve burning and sticking in tractors on the farm.	University of Illinois	22,570
Thermal death times of heat-resistant food spoilage organisms in the presence of antibiotics.	Washington Agricultural Experiment Station.	29,400
Determination of the solubilities of fatty acids, esters, and alcohols.	University of Minnesota	32,326
Increase the use of honey in the manufacture of 2 basic types of cookies and the Armed Forces ration, special survival honey biscuit.	Kansas Agricultural Experiment Station	7,982
Aerobic oxidation of dairy wastes under practical dairy-plant conditions.	Engineering Experiment Station, Pennsylvania State College.	33,480
Methods and procedures for obtaining a better quality maple sap.	Agricultural Experiment Station, Michigan State College.	9,798

Research contracts negotiated under the contracting authority of the Research and Marketing Act of 1946—Continued

Subject	Contractor	Contract price
FISCAL YEAR 1952—continued		
Relationships between cottons of different properties and their response to acetylation.	Georgia Technical Research Institute	$20,410
Improve the quality of processed tomato products	Agricultural Experiment Station, University of Maryland.	18,702
Improving the Pressley strength test	School of Textiles, Clemson Agricultural College.	5,880
Processing of sugar beets	University of Michigan	35,840
Converting bagasse into boards acceptable for making commercial shipping containers.	Research Foundation of State University of New York.	18,700
New techniques for measuring cotton fibers	Textile Research Institute	30,771
Assay tests for toxicity of trichloroethylene-extracted soybean oil meal to calves and guinea pigs.	Iowa State College of Agriculture and Mechanic Arts.	20,800
Quantitative studies on toxicity of trichloroethylene-extracted soybean oil meal to young cattle, swine, and poultry.	University of Minnesota	36,530
Preignition of alcohol fuels	Massachusetts Institute of Technology	42,700
Feed supplemental value of experimentally produced antibiotics by chick tests.	Wisconsin Alumni Research Foundation	12,000
Relationship between color and maturity in sweet corn.	Utah Agricultural Experiment Station	17,173
A practical ozone oxidation process for converting turpentine into acids suitable for the production of synthetic lubricants.	Armour Research Foundation of Illinois Institute of Technology.	31,481
Shelf life of fresh cut-up poultry	University of Nebraska (College of Medicine).	20,066
Survey of food and nutrition research (with Bureau of Human Nutrition and Home Economics—total contract price $16,000).	National Academy of Sciences	8,000
Methods of using soy flour in pastries	Kansas State College	500
Wet separation process for sugarcane bagasse	Research Foundation of State University of New York.	500
Total, fiscal year 1952		455,609
FISCAL YEAR 1953		
Processing of sour cherries	Michigan Agricultural Experiment Station.	12,000
Sugarcane milling tests	Louisiana State College	19,457
Frictional properties of cotton fibers	Clemson Agricultural College	25,642
Luster of cotton textiles	Harris Research Laboratories	29,883
Esters of furfural derivatives	Armour Research Foundation	500
Do	Battelle Memorial Institute	500
Mercerization of cotton fibers without tension	North Carolina State College	30,835
Discoloration of potato chips [4]	Cornell University Agricultural Experiment Station.	20,635
Pollution effects o fdairy wastes and their abatement.[4]	Pennsylvania State College	47,590
Benefits of resting of wool [4]	Textile Research Institute	45,838
Determination of dipole moments and dielectric constants of peroxides.[4]	The trustees of the University of Pennsylvania.	30,199
Properties of toxic proteins [4]	University of Minnesota	20,059
Studies on the molecular shapes of dextran by flow birefringence measurements.[4]	Iowa State College of Agriculture	6,000
Soybean proteins in meat products and frozen confections.[5]	Food Technology, Inc	10,000
Crystallization of beet sugar [5]	College of the Holy Cross	20,555
Manufacture of bleached specialty papers from wheat straw and bagasse.[5]	The Research Foundation of State University of New York.	25,000
Compilation of available data on nutrient composition of cereal grains.[5]	National Research Council	25,000
Sterilization of shelled and processed eggs [5]	Massachusetts Institute of Technology	40,000
Oxidation of pinene to pinic acid [5]	Georgia Institute of Technology	20,000
Bread staling [5]	American Institute of Baking	15,000
Total, fiscal year 1953		444,693
Grand total, all contracts (fiscal year 1948–53, inclusive).		2,413,213

[4] Contract negotiated; formality of signature only required.
[5] Negotiation initiated; not yet completed.

Mr. HORAN. As to the other work, how many projects are you working on now?

Dr. HILBERT. That is, covering all the financial projects on which the Bureau is working?

Mr. HORAN. I mean out of the total number you are working on, strictly within the Bureau.

Mr. DONOVAN. Probably the best way to arrive at that is to relate it to money. In other words, we have about $444,000 going into research contracts annually, out of a total of approximately $7.5 million.

Mr. HORAN. Do you have the total number of projects? I imagine it would be rather difficult to state that.

Dr. IRVING. We have quite a number of kinds of projects where we have work on all of them, broken down into line projects. The contracts that are line projects, within the figure that Dr. Hilbert has indicated, as against some 300 within the Bureau itself.

Mr. HORAN. It would be about 300 in the Bureau, and there would be about 100 under contract relationships?

Mr. DONOVAN. Yes. That 100, however, is the total over some 6 years.

Dr. HILBERT. On the average, we have been letting about 20 contracts a year.

Mr. HORAN. You can give the final figures for the record?

Dr. HILBERT. Yes.

(The information requested is as follows:)

Research contracts let by Bureau of Agricultural and Industrial Chemistry during each fiscal year

1948	13	1952	22
1949	6	1953	20
1950	18		
1951	21	Total	100

DEVELOPMENT OF NEW AND IMPROVED UTILIZATION OF COTTON AND WOOL FIBERS

Mr. HORAN. Now, for the increases requested.

Dr. HILBERT. The increases which have been requested, are for work on food and feed preservation and for the development of new and improved uses for cotton and wool fibers.

Mr. HORAN. How much money are you spending in that particular field now, out of your regular funds?

Dr. HILBERT. In the field of cotton?

Mr. HORAN. Yes.

Dr. HILBERT. In the field of cotton at the present time it is $1,078,000.

Mr. HORAN. I would like to know why you propose the increase.

Dr. HILBERT. I will be glad to describe to you the problems we are working on.

In the field of grain and forage crops we would undertake work on improving the storage life, and determining those conditions conducive toward preserving corn and wheat.

Mr. HORAN. That is the first increase you are speaking about?

Dr. HILBERT. Yes.

Mr. HORAN. We were speaking about cotton, and I think we might go back to the item for cotton.

Dr. HILBERT. In the field of cotton, one project that we would undertake work on concerns the evaluation of interspecies cotton. That is a new type of cotton that has been developed by the Bureau of Plant Industry. It has 50 percent greater strength than ordinary cotton.

Up until the present time the Bureau of Plant Industry has produced quantities which have been so small that it has been impossible to get a picture on the processing characteristics of this cotton. However there will be available during the next fiscal year sufficient quantities of cotton so that this information can be obtained.

One of the important trends in agriculture in the last 10 years has resulted from a recognition of the importance of the processing characteristics of new varieties of a commodity. The importance of processing characteristics has not been fully appreciated in the past. Frequently new varieties of cotton have been produced on a large scale without adequate prior testing of processing characteristics.

For example, a few years ago the variety of cotton produced in California was found to have poor processing characteristics. The farmer had to sell it at a discounted price.

In this field of work we would study the processing characteristics of interspecies cotton with the idea of finding out whether it can be processed smoothly and also to find out the end uses for which it is best suited. For example, because it has more strength, there is no doubt it will find use in the industrial field; that is, for making belts, cotton tire cords, and so on. We are not certain that the strength characteristics of the fiber will be reflected in the end product.

Mr. HORAN. You are planning to do that with this increased money?

Dr. HILBERT. Yes.

Mr. HORAN. You are not doing any of that work now?

Dr. HILBERT. We are not doing any work along that line.

Mr. HORAN. I am wondering how you go about changing as between one project and another, and abandoning or suspending for a period of time when you find something that needs more work done on it immediately.

Dr. HILBERT. This type of study would involve drafting, spinning and weaving of the interspecies cotton. At the present time the men we have working on spinning, weaving, and drafting of cotton are dealing with the improvement of processing procedures.

We have another group working on a project to improve the settings of drafting frames. It has been found that settings for drafting cotton used in textile mills does not produce the most uniform fabric. This work has been under way for about 5 years, that is, the studies on drafting.

Mr. HORAN. You mean the work that you are asking the increase for has been under way for 5 years?

Dr. HILBERT. No. I am attempting to explain the work which is being done by the group on this other work. They could not undertake the study on interspecies cotton, without dropping the work that is being done at the present time, which we consider very important. In other words, the work we have under way involves a group who are engaged on spinning and weaving of cotton, which we regard as

an important project. I was attempting to describe the problems that we are engaged on.

Mr. HORAN. How many projects do you have on cotton? I still do not quite understand why you need the increase.

Dr. HILBERT. This work is carried on at the southern regional research laboratory; and of course, the work is done in New Orleans.

We have four groups working on cotton. One group is carrying on basic studies on cotton with regard to its properties and on new methods for measuring them.

We have another group working on the characteristics of cotton, to overcome the undesirable properties of cotton. This group is engaged almost entirely in an attempt to meet the competition of synthetic fibers in the industrial-use field.

Another group is working on cotton in an attempt to improve and lower the costs of processing.

Then we have another group working on equipment used in the textile mills. This group is concerned with developing new types of equipment. For instance, last year we developed a new type of cotton opener. The industry has taken that over very rapidly, and the result is a saving of $1 to $2.50 on every bale of cotton opened.

Those are estimates that have been made available to us by the cotton mills.

Mr. HORAN. Dr. Hilbert, I am going to ask the gentleman who is more concerned with the cotton industry to develop this more fully, but so far I do not think you have quite justified the $200,000. Do you?

Dr. HILBERT. No; I was just giving you a little background.

Mr. HORAN. Mr. Whitten, would you like to follow this up?

Mr. WHITTEN. Insofar as the justification of expenditures for the research program, I think you have shown the need for it. I think it would be appropriate, however, to show the amount of Egyptian cotton that has been imported into the United States because of its increased strength over the native cotton.

I would like you to also set out in dollars and cents the amount of loss to the cotton growers to competition in the development of synthetics; and how much work you have been doing to meet those things, because as long as we have a price-support system on any commodity, if it is losing its market, the Federal Government in comparison is running the risk of a dollars-and-cents loss. I would like to have you develop for the record how much attention should be given to that.

I would like also to have you expand a little more fully in the record the number of people you have in this field, and, under your request, what you will be doing next year that will take the extra $200,000.

Dr. HILBERT. I will be glad to supply it.

(The information requested follows:)

An increase of $200,000 under the project "Cotton and other fiber utilization investigations" for research to obtain new information to extend and improve utilization of cotton and wool fibers:

IMPORTATION OF EGYPTIAN COTTON

The 5-year average (1948–52) importation of Egyptian cotton was 166,000 bales annually.

COMPETITION BETWEEN COTTON AND MAN-MADE FIBERS

Tire cord.—Cotton was formerly used in tire cord at the rate of about 700,000 bales annually. It is now used at rate of 200,000 bales annually and for economic reasons this will probably decrease in future. Cotton is technically satisfactory in passenger-car and light-truck tires.

Industrial markets.—About 2¾ million bales of cotton went into industrial markets, including belting, bags, filter cloth, laundry press covers, and other cotton products last year. Unless the situation is changed through research, it is to be anticipated that cotton will lose many of these markets in future years because of its high cost compared with paper products and with man-made fibers. Bureau research is helping to maintain cotton's position in certain important industrial markets—for example, in the laundry trade which uses about 110,000 bales annually, and in bags which have been using about 350,000 bales per year.

Clothing and household uses.—Research is pointing the way to the endowment of cotton with improved qualities which bring it into new favor in these fields, and is contributing to the swing from rayon to cotton in the women's clothing field evident during the past few years.

Need for additional research.—The need for additional research on the utilization of cotton and wool is urgent because of the increasing threat to their markets by man-made fibers. The following table shows the phenomenal increase in the quantity of man-made fibers produced in the United States during the last 10 years:

	United States production, million pounds	
	1942	1952
Cellulosic fibers (rayon and acetate)	632.6	1,135.8
Noncellulosic fibers (nylon, orlon, etc.)	25.2	260.6

There are two reasons for the inroads which these new fibers have made into the markets formerly held by cotton. (1) They are offered at a lower cost than the corresponding cotton product, or (2) they possess some particular quality for special uses to a higher degree than cotton. Market surveys have shown that cotton has a greater number of good qualities than any man-made fiber, but each competing fiber has one or two qualities which make it preferable for some specific uses.

Chemical research has already resulted in the commercial adoption of a treatment known as partial acetylation which makes cotton more resistant to deterioration by heat. This increased heat resistance is very important for laundry press covers, and it is enabling cotton to compete favorably with nylon for this market which annually uses the equivalent of over 100,000 bales.

Research has also shown that it is possible to reduce the cost of processing cotton by improved processing techniques. An example of past accomplishment in processing research was the development of a new machine for opening the cotton from compressed bales and putting it in a fluffy condition suitable for processing into yarn. Textile mills have estimated that this machine is responsible for savings ranging from 50 cents to $2 for every bale processed.

WOOL

The need for additional research on the utilization of American-grown wool is also very urgent. The wool growers of this country are threatened with the loss of their markets, not only because of the inroads of the man-made fibers, as noted above, but also because of the importation of wool grown in foreign countries, such as Australia and New Zealand.

EXPLANATION OF PRESENT PROGRAM WITH ASSIGNED PERSONNEL AND NEED FOR INCREASE

The Bureau's research program on cotton and wool is designed to protect the grower against increasing competition from man-made fibers by developing chemical and physical treatments that will improve the processing behavior of those

fibers, and improve the quality and increase the variety of products made from them. It also has as its objective the narrowing of the price gap between producer and consumer through improvement in processing efficiency to lower manufacturing costs. This program has been arrived at after consultation with the Department's commodity advisory committees, with qualified representatives of the Armed Forces, with representatives of grower groups, of State experiment stations, and many others. The research is equally applicable to cotton grown in all producing areas of the United States. Current activities and total available technical personnel in this field are as follows:

Current program	Assigned personnel
Development of new equipment for cleaning mechanically harvested cotton which will enable textile mills to remove trash from the cotton more economically and with a substantial reduction in the loss of good cotton fiber	11
Improvements in the drafting of cotton which will make it possible to produce uniform yarns of higher quality	6
Studies directed toward the optimum utlization of the properties of cotton fibers, such as length, strength, and fineness, in the processing of these fibers into yarns and fabrics	7
Investigations of the effect of differences in yarn and fabric structure upon the serviceability of cotton fabrics	6
Development of a chemical t eatment which will impart permanent flame resistance to cotton clothing and household fabrics to help cotton maints in a commanding position in a market which currently uses the equivalent of about 4 million bales of cotton annually	15
Development of partial acetylation to improve the resistance of cotton to deterioration by heat and rotting to help cotton maintain its position in markets which use annually the equivalent of about 5 million bales	17
Development of a treatmer t to reduce the crystallinity of cotton cellulose to increase resiliency and thus help cotton to maintain its position in markets which use annually the equivalent of about 3 million bales	12
Production of cotton textiles chemically modified with betapropiolactone to reduce its ability to absorb moisture which is undesirable in such uses as electrical insulation. It is estimated that reduction in moisture absorbency would enable cotton to maintain its position in this market which uses annually the equivalent of about 150,000 bales	2
Weatherproofing of cotton textiles with selected chemical finishes to help cotton to maintain its position in markets such as awnings, tents, tarpaulins, tobacco shade cloth, etc., which use annually the equivalent of about 1½ million bales	6
Basic investigations of changes in the primary wall of the cotton fiber caused by chemical modification and the effect of chemical treatments on fiber, yarn, and fabric properties	21
The correlation of the size and shape of the wool molecules with such desirable fabric characteristics as strength, elasticity, and resiliency	8
Research on the improvement of wool by chemical treatment with betapropiolactone which combines with it to greatly (1) improve felting qualities, (2) increase resistance to soiling, (3) soften the "hand" in the dry condition and (4) increase surface conductivity	4

These important problems will continue to occupy the full attention of the personnel and funds now assigned to them.

The additional funds requested under this item are required to initiate research not now under attack in the Bureau and that should not wait for attention until current research on problems of equivalent urgency is completed. Specifically the work and technical personnel required will consist of the following:

Proposed program under increases	Proposed personnel
Investigation of new types of cotton with greatly increased fiber strength to determine how this additional fiber strength can best be converted into yarn and fabric strength. It is estimated that with increased strength cotton can maintain its position in markets which normally use the equivalent of about 6½ million bales	6
Research aimed at reduction in the amount of cotton waste at the card where in present practice approximately 488 million pounds of cotton, potentially worth 30 to 35 cents per pound appears annually as waste worth 1 to 24 cents per pound	6
Research directed toward improving the wrinkle—and crush-resistance of cotton (by resin-forming substances) which will help to maintain its position in markets which normally use the equivalent of about 3 million bales of cotton per annum	4
Research to develop chemically modified cottons known as cellulose ethers which we have already found to have improved qualities of resistance to heat and rotting, similar to those imparted by partial acetylation—qualities important in a market which uses annually the equivalent of 5 million bales of cotton	6
Expanded research to develop new equipment designed to remove the additional trash found in mechanically harvested cotton more efficiently and reduce the loss at the cleaner of good cotton fiber now estimated at 1¼ million bales per annum	6
Research to develop aldehyde and other chemical treatments to confer upon wool increased resistance to wear (abrasion), shrinkage, deterioration by moths, or other insects and damage during carbonizing, scouring, and dyeing	6

Mr. LAIRD. Dr. Hilbert, you mentioned something about the experimental staff connected with California cotton.

Dr. HILBERT. Yes.

Mr. LAIRD. I wish you would elaborate a little bit on that, and if it meets with Mr. Whitten's approval, just include that as a part of your statement.

Dr. HILBERT. Yes.

Mr. LAIRD. Do you have any comment to make on this question of producing only one type of cotton in a State?

Dr. HILBERT. It makes it much simpler from the standpoint of the textile industry. I think the textile industry, that is, for many uses, prefers one variety of cotton, such as is being produced in California. But of course there are varieties of cotton produced in other States. The one particular type of cotton adapted to California is favored by uniform climatic conditions. As you know in a number of Southern States the climate varies very markedly. Cotton is grown in New Mexico and Arizona under irrigated conditions; and it is produced in Texas, in areas where there is not much rainfall, and in other areas where the rainfall is heavy. Cotton is produced all through the southern belt to North Carolina, and the conditions of temperature and climate differ quite widely. So it would be impossible to produce one variety of cotton throughout the United States.

Mr. LAIRD. I can understand why a State like California would produce pretty much the same kind of cotton, because the conditions are the same. Of course from time to time we have a group that would like to produce a different staple, and think they might make more money out of another variety, but I think on the whole they still adhere mostly to one type in Califronia and every possible attempt to improve its use is appreciated.

Dr. HILBERT. Yes.

RESEARCH RELATIONSHIPS WITH INDUSTRY

Mr. HORAN. I would like to have you, before we get into the first item of increase, give us a thumbnail sketch of your relationship in research to the colleges and private industry. It is my understanding you work very closely with private industry.

Dr. HILBERT. Yes.

Mr. HORAN. And that you are very eager to cooperate with them.

Dr. HILBERT. Yes. The Bureau's main function is to engage in research on the processing and utilization of agricultural commodities. The three most important problems that we are engaged in, concern the lowering of processing costs; developing new and extended uses for agricultural commodities; and the third one concerns developing methods for converting commodities to a permanent stable form. The Bureau is actually known as the utilization bureau in the Department.

Mr. HORAN. It cannot be otherwise. Actually the assistance to agriculture is, unfortunately, often indirect; it cannot be otherwise, in trying to increase uses.

Dr. HILBERT. That is right.

Mr. HORAN. And to find commercial acceptability of agricultural products, naturally it is an indirect help to farmers, but without processing the farmer cannot expect to benefit, and without finding

new methods of processing and of reducing transportation costs, while industry and the consumer gets the first benefit, it is also a benefit to American agriculture.

Dr. HILBERT. Yes. The Bureau of Plant Industry is called the Plant Production Bureau; the Bureau of Entomology, of course, works on plant diseases and insects. The Bureau of Human Nutrition and Home Economics is the Home Economics Bureau. We do work very closely with them, and problems confronting all of us are attacked jointly, not only by these other Bureaus, but with experiment stations. Then in the case of industry, we encourage them to take up development as rapidly as possible, to work with us in the solution of these problems.

As far as formal agreements with industry are concerned, we have many. I would say we have in the neighborhood of 60 agreements where we are jointly attacking the problem; where we will agree to finance certain portions of the work, and where industry will agree to finance a portion of it.

Mr. HORAN. Dr. Shaw has discussed the point of searching out the best talent, wherever it can be found, to work on specific projects, and to farm out as many of these projects as possible; and as a result you say you have some 100 contractual relationships.

Dr. HILBERT. Yes.

Mr. HORAN. I want to commend you for that.

Now, you have an increase of $300,000—it is even more specific than that—$300,478, which would seem to indicate that you know exactly what you are going to do with this increase.

Mr. DONOVAN. That $478 is to round out the total estimate for the Bureau.

FOOD AND FEED PRESERVATION

Dr. HILBERT. This is to attack the general problem of food and feed preservation, to promote more efficient utilization. It concerns fields in which we are doing a great deal of work at the present time. For example, earlier this morning, I indicated that we were developing a new process for the production of orange powder. Obviously that work should continue to be carried on. We should be working on the possibility of producing grape juice powder, apple powder, and other fruit powders, and vegetable powders such as asparagus powder.

Mr. HORAN. Has much of this work been going on for some time?

Dr. HILBERT. We have worked on the orange powder; and we have had a group working on the dehydration of vegetables for the last 2 or 3 years. The work has met with success in the last year, but that work has not been completed. The work we have done has been on processing concentrated orange juice from Valencia oranges grown in Florida.

The reason we have used Florida oranges is because that is the cheapest way to conduct the work, cheaper than purchasing a large quantity of oranges and working up the juice ourselves. We have purchased large quantities of frozen concentrated orange juice, rather than attempting to obtain the fresh oranges, because we just could not operate in that way without buying more equipment.

We have not tried out the processing of California oranges, particularly navel oranges. The big problem with California oranges is the

navel orange, because they tend to develop a bitterness on canning, and no good use of California navel oranges in that direction has ever been developed.

We think it is possible to produce an orange powder from California navel oranges. As far as costs are concerned, we have not worked them out to the point that we would like.

The principal advances that we have made are locking in the orange flavor through the use of a product known as Sorbitol and in increasing the storage life. We want to find a more economical process for locking this flavor in the juice.

Then we would attempt to do the same thing with other fruits, making fruit powder.

Mr. HORAN. Then do I understand this increase is due to expanding into other varities of fruits and vegetables?

Dr. HILBERT. That is right.

Mr. HORAN. For which you want this $300,000?

Dr. HILBERT. That is correct. We want to apply these processes and tests with respect to other fruit juices, and also the production of vegetable powders, such as tomato powder, asparagus powder, broccoli powder.

Mr. HORAN. There has been a lot of work in that field already?

Dr. HILBERT. No satisfactory powder has ever been produced.

Mr. HORAN. But I think an awful lot of work has been done in this field.

Dr. HILBERT. No satisfactory orange powder has ever been produced before we prepared it. No satisfactory apple powder has been produced.

Mr. HORAN. Are there any questions? If not, I will ask you to supply the same kind of information with respect to this $300,000 that you gave in response to the question for cotton.

Dr. HILBERT. Yes.

(The information requested follows:)

An increase of $300,478 for research on food and feed preservation to promote maximum efficient utilization to meet expanding population needs: This increase is distributed to the following financial projects:

Project 1. Cereal and forage crop utilization investigations	$40, 128
Project 3. Fruit and vegetable utilization investigations	180, 350
Project 6. Poultry, dairy, and animal products utilization investigations	80, 000
Total increase	300, 478

EXPLANATION OF PRESENT PROGRAM WITH ASSIGNED PERSONNEL AND NEED FOR INCREASE

The Bureau's research program on the preservation and improved utilization of agricultural commodities for foods and feeds is designed to protect the grower against storage losses and to provide for him expanded outlets in the form of processed foods and feeds, stable in storage, excellent in quality, and convenient in use. It aims at narrowing the price gap between producer and consumer through improvement in processing efficiency to lower manufacturing costs, and in transportation and storage efficiency through maximum reductions in weight and bulk without sacrifice of quality. This program has been arrived at after consultation with the Department's commodity advisory committees, with qualified representatives of the Armed Forces, with representatives of grower groups, of farmer cooperatives, of State experiment stations, and many others.

Current activities and total available technical personnel in this field are as follows:

Current program	Assigned personnel
Cereal and forage crop utilization investigations:	
Laboratory and pilot-plant studies on the development from agricultural materials of a therapeutically safe and economical blood plasma substitute that can be stockpiled to meet urgent military and civilian needs	65
Development of practical operating data on the effect of alcohol-water injection mixtures on the performance of essential farm tractor, truck, and aircraft engines	11
Basic and applied research on methods for improved utilization of an development of new uses for wheat, corn, and rice, and control of deterioration in wheat flour, rice, and alfalfa	37
Development of fermentation processes for producing vitamins, proteins, and antibiotics for feed supplements, and organic acids and other industrial chemicals	22
Fruit and vegetable utilization investigations:	
Research on improving juices and juice concentrates of citrus fruits, apples, grapes, cherries, tomatoes, and strawberries to decrease further weight and bulk and to enhance stability to avoid necessity for freezing storage	54
Research on reduction to powder form of citrus juice to provide stable products of low weight and bulk but high quality for use in domestic or foreign areas where refrigeration is not available	2
Research on preservation by freezing or canning of partially dehydrated apples, prunes, sour cherries, peas, pimientoes, and lima beans to reduce shipping and storage costs without sacrifice of product quality	15
Research designed to improve quality of frozen fruits and vegetables and to establish storage and transportation conditions required for quality retention	26
Research designed to improve dehydrated potatoes, carrots, peas, sweet corn, cabbage, beans, and peaches to develop excellent quality stable dried products of low weight and bulk, convenient in preparation for the table to provide expanded domestic and export markets	54
Research seeking methods for sterilizing canned fruits and vegetables without severe heating	5
Research in fruit constituents such as enzymes, polyphenols, proteins, carbohydrates, fats, vitamins, pigments, pectins, flavorful constituents, and others which govern quality to provide the basis for development of processing and storage techniques to control discoloration, flavor deterioration, loss of texture, and other qualities in processed products	33
Basic research in vegetable constituents such as enzymes, polyphenols, proteins, carbohydrates, fats, vitamins, pigments, pectins, flavorful constituents, and others which govern quality to provide the basis for development of processing and storage techniques to control discoloration, flavor deterioration, loss of texture, and other qualities in processed products	38
Livestock feed from fruit and vegetable wastes to convert a critical waste-disposal problem to an economic operation	7
Poultry, dairy, and animal products utilization investigations:	
The development of new and expanded uses for animal fats, currently in ruinous surplus	31
The development of practical means for disposing of dairy wastes that now threaten closing of many milk processing plants; fundamental research on milk proteins to find means for preserving the desirable qualities of milk in processed products	17
Basic research on hide proteins to improve leathers and develop new and expanded outlets for animal skins	13
Investigation of the effects of processing variables on the quality of processed poultry and of chemical factors on the quality and storage stability of dried egg products; development of new and expanded uses for poultry byproducts	25

These important problems will continue to occupy the full attention of the personnel and funds now assigned to them.

The additional funds requested under this item are required to initiate research not now under attack in the Bureau and that should not wait for attention until current research on problems of equivalent urgency is completed. Specifically the work and technical personnel required will consist of the following:

Proposed program under increases	Proposed personnel
Cereal and forage crop utilization investigations:	
Research to develop procedures for determining prior to storage and the suitability for storage of corn and other cereals and to devise means for avoiding the present higher losses in storage of high-moisture grain	7
Fruit and vegetable utilization investigations:	
Extension of process for preparation of orange-juice powder as well as dehydrocanning and concentration of juices and purees to fruits and vegetables not now being investigated including Vinifera grapes, apples, tomatoes, strawberries, cane berries, apricots, and peaches to provide improved products for domestic and foreign markets	10
Establishment of storage requirements of frozen citrus concentrate with special reference to solution of the serious "cardboard" off-flavor problem	2
Establishment of sound processing procedures for vegetables of the Rio Grande Valley to provide a vegetable industry to replace citrus lost in the freezes of recent years	6

Proposed program under increases	Proposed personnel
Poultry, dairy, and animal products utilization investigations:	
Investigation of the physical effects of spray drying on the functional properties of dried whole egg to find means for correcting present deficiencies of dried compared with fresh egg for cake baking and other food-product uses where whipping properties need to be preserved	6
Research on chemical constituents, especially the proteins of poultry, which determine the flavor, texture, and other quality factors including investigation of the rate at which deterioration takes place in storage at various temperatures to develop commercially practical practices which will avoid losses by rancidification, desiccation, darkening, and other deteriorative processes	10

PERSONNEL

Mr. HORAN. Please discuss the five positions in the Personnel Division.

Mr. DONOVAN. We have in Washington five positions, as you have referred to here: There is a Chief Personnel Officer and an assistant personnel officer. Then we have a clerk and a stenographer. Those positions make up a part of the Bureau staff engaged in personnel work.

We have a total of 13.5 persons who are on personnel work. Our Bureau's work is almost completely decentralized—96 percent of the staff is in the field. Personnel activities are also decentralized. We have in the field, in addition to those in Washington, approximately eight persons engaged entirely on personnel work, and a small portion of the time of the business manager in each regional laboratory.

Mr. HORAN. You have five here in Washington now?

Mr. DONOVAN. There are only 4 at this time. We have 13.5 persons engaged on personnel work.

Mr. HORAN. With eight in the field?

Mr. DONOVAN. Eight in the field engaged entirely on personnel work.

ADMINISTRATIVE SERVICES

Mr. HORAN. Then you have 18 in administration.

Mr. DONOVAN. The 18 you are referring to are here in Washington. That staff has been reduced to 14 employees today in the administrative services group. The reduction is due in part to the fact that as a result of a survey made of all our accounting work, both in Washington and the field, we were able to make some adjustments with consequent reduction in our Washington bookkeeping staff.

Mr. HORAN. Do you have any administrative people in the field?

Mr. DONOVAN. Yes; we have in each of our 4 regional laboratories a business manager, and a business staff of approximately 25 persons including bookkeepers, auditors, purchasing clerks, file clerks, stenographers, messengers, and so forth, as well as the personnel clerks referred to before.

Mr. HORAN. In each of the field offices.

Mr. DONOVAN. That is correct.

Mr. HORAN. That would be about 100 altogether?

Mr. DONOVAN. Yes. Those staffs, together with the Washington office staff, carry on all of the Bureau business and personnel activities. In Washington our total Bureau staff—that is, the Office of the Chief of Bureau and business staff—is 51 persons. The work, as I

say, is decentralized, and authority is given the staff in the field to carry out functions that otherwise would require a very large staff here in Washington.

The decentralization of business functions took place at the time of the general reorganization of the Bureau in the early forties or 1939, when the Bureau was set up on the regional basis.

INFORMATION SERVICE PERSONNEL

Mr. HORAN. You have six on information here?

Mr. DONOVAN. Six on information, yes.

Mr. HORAN. What is the need for that? Do you have a lot of requests for information?

Dr. HILBERT. Yes, we do. On the information staff the head of the office is responsible for coordinating and directing the publications and information work of the Bureau. And he also advises the Chief of the Bureau on information problems, in addition to coordinating activities along with the other bureaus in the Agricultural Research Administration.

We have two technical editors, grade GS–9, who critically examine and review scientific and technical manuscripts and papers in the field of microbiology, chemistry, and engineering.

They also work with other research people in the Bureau, administrators and prepare technical articles for special reports. Then we have an information and editorial specialist in grade GS–7, who is responsible for the final editorial review before the material goes to the Government Printing Office to assure conformity with Government style.

Then we have an information clerk, grade GS–5, who responds to requests for publications, and for information on which there are publications. She also maintains a publications index on published information, compiles reports, and composes correspondence of the simpler type in answering letters.

There is also a clerk-typist in grade GS–3.

In the field, at the eastern laboratory, there is a GS–9 information and editorial specialist, who edits manuscripts and technical papers that originate in and are published outside the eastern laboratory. At the southern regional laboratory there is also a technical editor in grade GS–9, and a typist in grade GS–3.

At the western laboratory we have a technical editor in grade GS–11, who is responsible for the final editing of manuscripts and technical papers. At that laboratory there is also a GS–4 clerk-stenographer, engaged on information work.

At the Peoria laboratory there is a vacancy in the position of technical editor, GS–11. The technical editor died last August, and we have not been able to replace him as yet.

That is the story on information work in the Bureau.

CHEMISTS

Mr. HORAN. I notice you have four new grade GS–14 chemists in Washington.

Dr. HILBERT. Perhaps I should describe to you the work of the Chief's office. I am a grade GS–16, and there are five assistant chiefs. Mr. Donovan is assistant chief in grade GS–15.

Mr. HORAN. That would be natural. Then you have four others?

Dr. HILBERT. Four of the assistant chiefs are responsible for technical matters and are in grade GS–15. They coordinate the research work carried on under the various financial projects to coordinate and avoid duplication of work. They also work with the other bureaus as well as industry, and with the experiment stations. And, as you mentioned, each assistant chief has a technical assistant, grade GS–14.

Mr. HORAN. You have four less positions at grade 13. That is due to promotion of the other four?

Dr. HILBERT. Three of the technical assistants were promoted in the last year from GS–13 to GS–14, and we took the assistants in GS–13——

Mr. HORAN. In the field you have one new associate regional director?

Dr. HILBERT. That is correct.

Mr. HORAN. At grade 14.

Dr. HILBERT. Yes; there are two.

Mr. HORAN. You have two?

Dr. HILBERT. Yes. Two associates, grade GS–14.

Mr. HORAN. You have 16 new division heads in grade 14.

Dr. HILBERT. That is correct.

Mr. HORAN. You have 17 listed in grade 13. Those are all promotions?

Dr. HILBERT. That is right.

Mr. HORAN. We can almost justify the increase that way, can we not?

Dr. HILBERT. No. That came about as a result of promoting the chief from grade GS–15 to grade GS–16. About 2 or 3 years ago, you recall when Congress passed the new legislation, there were some 400 to 600 upgraded.

Mr. HORAN. Yes.

Dr. HILBERT. That tended to—as the Chief of the Bureau was reallocated from 15 to 16; the Assistant Chiefs moved from 14 to 15; then there have been some other adjustments.

FILM AND MOTION-PICTURE PRODUCTION

Mr. HORAN. If there are no further questions along that line, I would like to ask you if you are doing any work on films and motion pictures?

Dr. HILBERT. We are doing no work on films or motion pictures.

UTILIZATION OF STATISTICAL MACHINES

Mr. HORAN. How many IBM machines do you have?

Mr. DONOVAN. We do not use them; we have none.

Mr. HORAN. You have none.

Mr. DONOVAN. No; we have a number of bookkeeping machines.

Mr. HORAN. Because of the nature of the work you do, you really are not bogged down with too much statistical records?

STATUTORY AUTHORITY

Mr. DONOVAN. No. We rent no machines.

Mr. HORAN. I wonder if you would place in the record the basic

authority for each of the projects you have indicated. It is not necessary to list all of the projects.

Mr. DONOVAN. Yes.

(The information requested is as follows:)

BASIC AUTHORITY FOR ALL FINANCIAL PROJECTS OF THE BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY

The basic authority for all financial projects of the Bureau of Agricultural and Industrial Chemistry is contained in the organic act of May 15, 1862 (5 U. S. C. 511), establishing the Department of Agriculture, and the Agricultural Adjustment Act of 1938 (7 U. S. C. 1292), which latter directed the Secretary to establish, equip, and maintain four regional research laboratories, one in each major farm producing area. These laboratories are located at Peoria, Ill.; New Orleans, La.; Wyndmoor, Pa.; and Albany, Calif.

Mr. HORAN. Thank you, gentlemen. That concludes the hearing for this Bureau.

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

TUESDAY, MARCH 17, 1953.

WITNESSES

DR. A. H. MOSEMAN, CHIEF, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

DR. F. P. CULLINAN, ASSISTANT CHIEF, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

DR. K. S. QUISENBERRY, ASSISTANT CHIEF, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

DR. F. W. PARKER, DIRECTOR OF SOILS RESEARCH, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, AGRICULTURAL RESEARCH ADMINISTRATION

V. H. BEACH, BUDGET OFFICER, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

SALARIES AND EXPENSES

Amounts available for obligation

Description	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$11,453,730	$11,613,128	$12,390,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," animal research, pursuant to 5 U. S. C. 568b	−10,000		
Adjusted appropriation or estimate	11,443,730	11,613,128	12,390,000
Reimbursements from non-Federal sources	10,210	13,600	13,600
Reimbursements from other accounts	228,906	180,700	170,700
Total available for obligation	11,682,846	11,807,428	12,574,300
Unobligated balance, estimated savings	−51,347		
Obligations incurred	11,631,499	11,807,428	12,574,300
Comparative transfer from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	93,240	92,800	
Comparative transfer to—			
"Salaries and expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration," insect investigations		−5,000	
"Salaries and expenses, Soil Conservation Service"	−114,697	−116,000	
Total obligations	11,610,042	11,779,228	12,574,300

NOTE.—Reimbursements from non-Federal sources above are from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Plant, soil, and agricultural engineering research:			
(a) Field crop investigations	$3,571,129	$3,778,000	$4,142,000
(b) Horticultural crop investigations	3,484,144	3,273,000	3,398,000
(c) Forest disease investigations	490,360	499,000	599,000
(d) Soils, fertilizers, and irrigation agriculture investigations	2,543,561	2,696,000	2,796,000
(e) Agricultural engineering investigations	1,134,399	1,189,928	1,230,000
Subtotal	11,223,593	11,435,928	12,165,000
2. National Arboretum:			
(a) Operation and maintenance	110,545	111,000	187,000
(b) Development of physical facilities	36,788	38,000	38,000
Subtotal	147,333	149,000	225,000
3. Obligations under reimbursements from non-Federal sources	10,210	13,600	13,600
Total direct obligations	11,381,136	11,598,528	12,403,600
Obligations Payable Out of Reimbursements From Other Accounts			
1. Plant, soil, and agricultural engineering research:			
(a) Field crop investigations	73,744	42,600	40,000
(b) Horticultural crop investigations	15,435	13,800	12,600
(c) Forest disease investigations	21,624	25,100	24,200
(d) Soils, fertilizers, and irrigation agriculture investigations	88,085	79,400	79,500
(e) Agricultural engineering investigations	30,018	19,800	14,400
Total obligations payable out of reimbursements from other accounts	228,906	180,700	170,700
Total obligations	11,610,042	11,779,228	12,574,300

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	2,092	2,104	2,257
Full-time equivalent of all other positions	185	192	208
Average number of all employees	1,999	2,071	2,221
Average salaries and grades:			
General schedule grades:			
Average salary	$5,162	$5,155	$5,099
Average grade	GS-7.5	GS-7.5	GS-7.4
Crafts, protective, and custodial grades:			
Average salary	$3,027	$3,035	$3,041
Average grade	CPC-3.7	CPC-3.7	CPC-3.7
Ungraded positions: Average salary	$3,539	$3,682	$3,668
Personal service obligations:			
Permanent positions	8,608,220	8,933,000	9,512,200
Part-time and temporary positions	444,557	455,300	498,800
Regular pay in excess of 52-week base	33,198	35,300	35,700
Payment above basic rates	19,146	19,900	20,400
Payment to other agencies for reimbursable details	1,926	1,900	1,900
Total personal service obligations	9,107,047	9,445,400	10,069,000
Direct Obligations			
01 Personal services	8,930,426	9,308,800	9,941,500
02 Travel	280,415	299,400	332,600
03 Transportation of things	50,731	56,000	59,400
04 Communication services	60,275	65,500	70,500
05 Rents and utility services	135,782	137,900	149,300
06 Printing and reproduction	120,457	112,300	114,300
07 Other contractual services	195,234	208,300	190,200
Services performed by other agencies	299,942	311,200	330,700
08 Supplies and materials	703,891	718,128	745,300
09 Equipment	293,683	380,700	410,800

Obligations by objects—Continued

Object classification	1952 actual	1953 estimate	1954 estimate
Direct Obligations—Continued			
10 Lands and structures	$325,963	$15,000	$65,000
13 Refunds, awards, and indemnities:			
Award for employee suggestions	115		
15 Taxes and assessments	15,207	20,300	31,000
Subtotal	11,412,121	11,633,528	12,440,600
Deduct charges for quarters and subsistence	30,985	35,000	37,000
Total direct obligations	11,381,136	11,598,528	12,403,600
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	176,621	136,600	127,500
02 Travel	10,910	3,500	3,000
03 Transportation of things	1,039	100	100
04 Communication services	3,500	4,200	3,900
05 Rents and utility services	8,372	8,900	8,800
07 Other contractual services	14,296	13,400	13,400
08 Supplies and materials	12,849	12,900	12,800
09 Equipment	874	500	500
15 Taxes and assessments	445	600	700
Total obligations payable out of reimbursements from other accounts	228,906	180,700	170,700
Total obligations	11,610,042	11,779,228	12,574,300

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$1,524,169	$1,916,118	$1,713,246
Obligations incurred during the year	11,631,499	11,807,428	12,574,300
Adjustment in obligations of prior years	9,309		
	13,164,977	13,723,546	14,287,546
Deduct:			
Reimbursable obligations	239,116	194,300	184,300
Unliquidated obligations, end of year	1,916,118	1,713,246	1,833,246
Total expenditures	11,009,743	11,816,000	12,270,000
Expenditures are distributed as follows:			
Out of current authorizations	9,721,772	10,100,000	10,757,000
Out of prior authorizations	1,287,971	1,716,000	1,513,000

Mr. ANDERSEN. The committee will come to order, gentlemen.

We will insert pages 228, 229, 232 through 235, and 250 through 278 of the justifications at this point.

(The matter referred to is as follows:)

PURPOSE STATEMENT

The Bureau of Plant Industry was established under provisions of the Agricultural Appropriation Act of 1902, approved March 2, 1901, and the act of June 3, 1902 (5 U. S. C. 524). In February 1943, the name was changed to the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Research is organized in four major groups, as follows:

1. *Field crops.*—Research is concerned chiefly with the production and improvement of cereals, cotton, forage, rubber, sugar, tobacco, and other important food, feed, fiber, oil, and specialty crops. Increased yield, improved quality, and resistance to diseases, insects, heat, drought, cold, or other hazards is sought by breeding, selecting, and testing varieties and by improving crop management practices. Improved methods of controlling weeds are also developed.

2. *Horticultural crops.*—Research is conducted on the production and improvement of fruit, vegetable, nut, and ornamental crops, and on methods of reducing

losses from diseases and deterioration involved in handling, processing, transporting, and storing these crops. Methods are developed for avoiding or controlling diseases of trees and forest products. Foreign plant explorations and introductions provide new crops and valuable breeding material for the development of improved crops. Investigations are also conducted on reducing crop damage caused by nematodes and on the control of plant disease epidemics.

3. *Soils.*—Soil investigations are directed toward (*a*) the determination of systems of soil management and irrigation that will increase soil fertility and give most efficient crop production; (*b*) the evaluation and improvement of fertilizers, liming materials and soil conditioners; and (*c*) the relation of soils to plant, animal, and human nutrition.

4. *Agricultural engineering.*—Agricultural-engineering investigations are concerned with (*a*) the improvement of farm machinery for planting, cultivating, fertilizing, spraying, dusting, and harvesting crops; (*b*) the development of improved equipment and facilities for processing and storing farm products; (*c*) the design of improved farm buildings and houses; and (*d*) the development and application of electrical equipment to farm use.

The Bureau also is responsible for the operation, maintenance, and development of the National Arboretum which was established by Congress in 1927 in the District of Columbia to provide a collection of living plants from this country and abroad valuable not only for breeding with native species to develop improved strains of trees, shrubs, and flowers for parks, boulevards, and other landscape uses, but also for study by students and scientists.

The research work consists primarily of field, laboratory, and greenhouse experiments conducted usually in cooperation with State agricultural experiment stations, industry, and others. Because of the diverse crops and wide range of soil and climatic conditions, it is necessary to conduct the work at numerous field locations. Research results are made available to farmers and others through increase and distribution of improved varieties, and by dissemination of information through the Federal-State cooperative extension service, publications, the agricultural press, and correspondence.

Work locations and personnel.—The headquarters of the Bureau are at the Plant Industry Station, Beltsville, Md. In the field, the work is conducted at approximately 195 locations in 45 States, the District of Columbia, Puerto Rico, Canal Zone, and Mexico. As of November 30, 1952, under all funds of the Bureau there were 2,126 full-time employees, including 119 in the departmental service, and 494 part-time employees. In addition there were 796 collaborators serving without compensation.

Appropriated funds:

Appropriated, 1953	$11, 584, 928
Budget estimate, 1954	12, 390, 000

Salaries and expenses

	Plant, soil, and agricultural engineering research	National Arboretum	Total
Appropriation act, 1953	$11, 465, 000	$149, 000	$11, 614, 000
Reductions pursuant to—			
Sec. 411	−855		−855
Sec. 412	−17		−17
Activities transferred in 1954 estimates from "Salaries and expenses, Office of Administrator, Agricultural Research Administration" for services at the Agricultural Research Center	+92, 800		+92, 800
Activities transferred in 1954 estimates to—			
"Salaries and expenses, Soil Conservation Service" for soil-survey activities (net transfer)	−116, 000		−116, 000
"Salaries and expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration," for research on methods for eradication of the screw worm through use of radiant energy	−5, 000		−5, 000
Base for 1954	11, 435, 928	149, 000	11, 584, 928
Budget estimate, 1954	12, 165, 000	225, 000	12, 390, 000
Increase	+729, 072	+76, 000	+805, 072

Summary of increases 1954

Plant, soil, and agricultural engineering research:	
To strengthen research on food, feed, and fiber crops to increase yields, improve their quality, and facilitate mechanized production	+$364,000
To strengthen research on citrus production, especially investigations of citrus diseases such as tristeza, or quick decline, to determine their cause and to develop control measures	+125,000
For research on the control of forest diseases especially in the Lake States and the Northwest	+100,000
For investigation on the influence of soils, fertilizers, and management practices on the nutritional value of plants	+100,000
For research on improvement of equipment for harvesting and cleaning small-seeded grass and legume seed crops	+40,072
Subtotal	+729,072
National Arboretum: To provide necessary care for existing plantings	+76,000
Total	+805,072

Project statement

Project	1952	1953 (estimated)	Increase	1954 (estimated)
1. Plant, soil, and agricultural-engineering research:				
(a) Field-crop investigations	$3,571,129	$3,778,000	+$364,000	$4,142,000
(1) Cereal production, breeding, disease, and quality investigations	(983,582)	(1,028,770)		(1,028,770)
(2) Cotton and leaf and stem fiber-crop production investigations	(623,382)	(625,260	(+50,000)	(675,260)
(3) Forage-crop production, breeding, disease, and quality investigations	(818,928)	(832,130)	(+64,000)	(896,130)
(4) Rubber production, breeding, and disease investigations	(33,656)	(34,230)		(34,230)
(5) Sugar-plant production, breeding, disease, and quality investigations	(536,482)	(556,540)	(+200,000)	(756,540)
(6) Tobacco production, breeding, disease, and quality investigations	(259,922)	(341,590)		(341,590)
(7) Drug, oil, insecticide, tannin, flavoring, and special product plant investigations	(100,224)	(101,390)		(101,390)
(8) Hop production, breeding, disease, and quality investigations	(29,633)	(30,070)		(30,070)
(9) Weed-control investigations	(185,320)	(228,020)	(+50,000)	(278,020)
(b) Horticultural-crop investigations	3,484,144	3,273,000	+125,000	3,398,000
(1) Deciduous-fruit investigations	(460,917)	(470,200)		(470,200)
(2) Citrus, avocado, and other subtropical-fruit investigations	(173,876)	(175,540)	(+125,000)	(300,540)
(3) Nut investigations	(286,709)	(298,430)		(298,430)
(4) Vegetable investigations	(622,672)	(633,610)		(633,610)
(5) Potato investigations	(181,998)	(189,340)		(189,340)
(6) Plants for landscaping and ornamental purposes and farm windbreaks, investigations of	(258,065)	(271,590)		(271,590)
(7) Methods of handling, transportation, and storage, and market diseases of horticultural crops, investigations of	(444,826)	(451,410)		(451,410)
(8) Plant introduction, testing, and maintenance of basic stocks	(432,014)	(431,670)		(431,670)
(9) Investigations to reduce crop damage caused by nematodes	(127,629)	(134,910)		(134,910)
(10) Basic studies of plant growth and development	(94,541)	(91,590)		(91,590)
(11) Research on plant disease epidemics and the identification of disease organisms	(125,897)	(124,710)		(124,710)
(12) Citrus laboratory at Orlando, Fla. (construction of)	(275,000)			
(c) Forest disease investigations	490,360	499,000	+100,000	599,000
(1) Diseases of forest and shade trees and forest products	(490,360)	(499,000)	(+100,000)	(599,000)
(d) Soils, fertilizers, and irrigation agriculture investigations	2,543,561	2,696,000	+100,000	2,796,000
(1) Soil improvement, management, and irrigation agriculture investigations	(2,167,899)	(2,214,210)		(2,214,210)
(2) Fertilizers and their improvement	(242,095)	(346,270)		(346,270)
(3) Investigations of the relations of soils to plant, animal, and human nutrition	(133,567)	(135,520)	(+100,000)	(235,520)

Project statement—Continued

Project	1952	1953 (estimated)	Increase	1954 (estimated)
1. Plant, soil, and agricultural-engineering research—Continued				
(c) *Agricultural engineering investigations*	$1,134,399	$1,189,928	+$40,072	$1,230,000
(1) Farm machinery	(373,896)	(391,118)	(+40,072)	(431,190)
(2) Farm structures and related investigations	(254,757)	(259,240)	----------	(259,240)
(3) Mechanical processing of farm products	(281,319)	(310,720)	----------	(310,720)
(4) Farm electrification investigations	(224,427)	(228,850)	----------	(228,850)
Subtotal	11,223,593	11,435,928	+729,072	12,165,000
2. National Arboretum:				
(a) Operation and maintenance	110,545	111,000	+76,000	187,000
(b) Development of physical facilities	36,788	38,000	----------	38,000
Subtotal	147,333	149,000	+76,000	225,000
Unobligated balance	51,347	----------	----------	----------
Total available or estimate	11,422,273	11,584,928	+805,072	12,390,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," animal research	+10,000	----------		
Transfer in 1954 estimates from "Salaries and expenses, Office of Administrator, Agricultural Research Administration"	−93,240	−92,800		
Transfer in 1954 estimates to—				
"Salaries and expenses, Soil Conservation Service"	+114,697	+116,000		
"Salaries and expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration," insect investigations	----------	+5,000		
Reductions pursuant to sec 411 and 412	----------	+872		
Total appropriation or estimate	11,453,730	11,614,000		

Status of Program, Plant, Soil, and Agricultural Engineering Research

FIELD-CROP INVESTIGATIONS

Research is conducted on the production and improvement of the principal farm crops including cereal, cotton, forage, sugar, tobacco, and other important crops. They provide the major sources of food and feed for livestock and important fibers and oils for industry. They include important soil-improving and soil-conserving crops. For the 1952 crop or marketing year, the total farm value of all crops amounted to approximately $18.1 billion. Research is also conducted on the development of the most economical and effective methods for controlling weeds.

Many new diseases and races of disease organisms are continuously appearing and threatening crop production. Each crop has its particular problems. For example, virus yellows of sugar beets and sclorospora of sugarcane are threatening domestic sugar production, and verticillium wilt is serious in certain cotton-producing areas. Farmers are also still faced with threats to production by diseases and pests which have been known for some time, such as leaf and stem rusts of wheat, black shank of tobacco, black root of sugar beets, corn borers, and others. While considerable progress has been made toward the development of good commercial varieties resistant to these established diseases and pests, much work remains to be done in this field.

The continuous pressure for greater use of machines for crop production greatly affects the breeding program. New varieties must be developed with uniform maturity, height of plant, and other characteristics important to mechanized handling.

Generally, such research involves long-term projects. Breeding, selection, and testing work ordinarily requires many generations to develop new varieties which are resistant to not one, but several diseases which may be prevalent, and which also have the quality, productivity, size, and other important agronomic characteristics essential to commercial production. Valuable sources of germ plasm to meet the needs for crop improvement have been or are being colleced through

foreign-plant introductions and the selection of domestic varieties. A strong research program is required to utilize these sources of material so as to bring about the increased yields and greater dependability of crop production which are so essential to meeting the demands of an expanding population.

Selected examples of recent progress

1. New wheat varieties released to farmers include Genesee in New York, Pennell in Pennsylvania, Saline in Illinois, Ponca in Oklahoma and Kansas, and Lee in Minnesota. Ponca will probably replace a considerable acreage of Pawnee in eastern Oklahoma and eastern Kansas since it is superior to that variety in resistance to leaf rust, hessian fly, and shattering and has better quality. Lee is resistant to a larger number of races of leaf rust than any other variety of spring wheat now available. New wheat varieties recently released for the Southeast are already commanding premium prices because of their superior protein content and quality. It is estimated that cereals contribute directly or indirectly through animal products some 40 percent of the calories included in the diet of the average citizen of the United States.

2. A new high-yielding oat variety, Craig, was released for New York State in cooperation with the New York Agricultural Experiment Station. It is resistant to the oat blight, *Helminthosporium victoriae*, has moderate resistance to crown rust, and some resistance to smut. It has produced exceptionally high yields in tests in New York and New England and should prove popular for growing on more fertile soils on dairy farms.

3. Two yield genes have been found in barley through basic research: One of these was successfully transferred to a commercial variety, resulting in a 17 percent increase in production. This offers the promise that through basic research and planned-breeding programs, the yields of commercial varieties may be raised by transferring genes for yield.

4. New rust-resistant flax varieties have been released which will do much to insure yields of flaxseed in the North Central States. During the past few years, new races of rust have spread through the important flax-growing areas of Minnesota and the Dakotas, causing complete destruction of the crop in some fields. Dakota, formerly the most popular commercial variety, is susceptible to these new races of rust. Four new varieties immune to the rust have been released. Marine, first released in 1952, is an early-maturing brown-seeded variety immune to all races of rust found in the North Central States. It is also wilt-resistant, and the least susceptible to pasmo of any of the commercial varieties now available. Because of its early maturity, it is an excellent variety for sowing in areas where moisture may be limited or where late sowing is unavoidable. Primarily because of these new varieties but also because of dry weather unfavorable to rust, the loss in 1952 was only 300,000 bushels as compared with 3 million bushels in 1951.

5. A new long-staple cotton, Coastland, has been developed for the Southeast in cooperation with the Georgia Coastal Plain Experiment Station. It yields up to 50 percent above the old Sea-Island varieties, and shows spinning properties equivalent to Egyptian Karnak. The strain was selected from a complex hybrid involving Sea Island, American Egyptian, and Tanguis.

6. Rapid test developed for evaluating new chemicals for cotton defoliation: Field-plot testing of the many new chemicals is laborious and costly. In cooperation with the Arkansas Agricultural Experiment Station, a rapid technique was developed which makes use of the cotyledons on seedling cotton plants under controlled greenhouse conditions. The effectiveness of new chemicals may be judged rapidly by comparing the results obtained with the reaction to defoliants known to have proved effective in field performance. Several manufacturers are cooperating in standardizing the procedure.

7. Seed of annual lespedeza should be harvested as soon as it is mature: It is usually combined after the first killing frost in the fall, which may be 2 to 4 weeks after it matures. Studies conducted in cooperation with the North Carolina Agricultural Experiment Station show that a delay in harvesting of 2 to 3 weeks after maturity resulted in seed losses of approximately 50 percent.

8. Pasture fertilization studies show that beef production can be increased at little cost. At Beaumont, Tex., pastures fertilized at a cost of no more than $2 to $3 per acre annually increased beef gains from 50 to 200 pounds per acre. There are approximately 2 million acres of land in Texas used for rice-cattle systems of farming to which the benefits of this study should apply. At Tifton, Ga., for the 2-year period, 1950 and 1951, Coastal Bermuda grass fertilized with 200 pounds of nitrogen per acre produced an annual average of 678 pounds of beef per acre as compared with 312 pounds from applications of 50 pounds of nitrogen per acre.

9. Crown-rot-resistant material developed for crimson-clover improvement: This disease is becoming a serious threat to the maintenance of stands in the east central and northern part of the Southern States where stands, reestablished year after year from volunteer seeding in the same field, favor the increase and severity of the disease. Crown rot attacks the plants during the winter and early spring months. Over a million seedling plants from domestic varieties, strains, and commercial seed, and from some 400 foreign lots from Italy, France, and Hungary, have been artificially inoculated. Plants showing even slight resistance were selfed and crossed in an effort to increase the resistance in succeeding generations. Results of two cycles of inoculation and selection have given approximately 50 plants that have some resistance. Plants from the second cycle of selection have shown greater resistance than the first.

10. Some progress made in Dallis grass-seed production: Dallis grass is one of the most important summer-growing grasses in the South. Mississippi alone requires 1,500,000 pounds of Dallis grass seed annually, but is now producing less than one-tenth of its needs. Development of seed-producing varieties has shown good progress in Mississippi during the past year. Seven hybrids which were resistant to ergot during 1949–50 were vegetatively increased during 1951. Seed setting ranged from 22 to 65 percent in these seven strains and herbage yield ranged from 35 to 86 percent more than common Dallis grass. Seed yields indicate double the production of ordinary Dallis grass.

11. A program has been developed for the regional testing of improved grasses: The purpose is to determine the possible distribution and regional adaptation of new strains or varieties of grasses developed in the breeding and improvement program before they are brought into general commercial seed increase. There have been instances where new varieties with possible regional adaptation have been proposed for release without neighboring States having an opportunity to test them. At the present time, there are 14 different grass species which include over 100 different strains in these tests. Thirty-seven States, Alaska and Canada, are participating. A total of 548 of these strain tests were distributed. Results are not available but information should be obtained at an early date which will be most beneficial in determining the possible seed needs and range of adaptation of new strains. This project was advocated by the regional technical advisory committee.

12. A new sugarcane variety, C. P. 44/101, first released in 1949, will occupy about one-tenth of the total sugarcane acreage in Louisiana in 1952, or 4 times the acreage in 1951. This rapid expansion in acreage indicates the great importance of this new variety. Yields of the new variety surpass the present leading commercial variety, C. P. 36/105, by approximately 4,300 pounds of sugar per acre on light soils and 3,800 pounds on heavy soils during the 3-year period of a cane crop. It is anticipated that by 1954 it will become the leading commercial variety in Louisiana.

13. Sugarcanes for sirup production may be stored 4 weeks without loss. Sugarcane sirup is usually manufactured by the farm family and limited manufacturing facilities and lack of adequate labor frequently causes a delay of 10 to 30 days between harvesting and milling. Many farmers were of the opinion that this delay caused a loss in yield and quality of sirup per ton of cane milled. Studies carried on at Meridian, Miss., however, have shown that sugarcane can usually be successfully stored under outdoor fall conditions in Mississippi for as long as 28 days without a loss in yield or quality of the sirup. There is no advantage in protecting the cane and the cost of evaporating the sugarcane juice to sirup is reduced as some moisture is lost during storage. The flavor of the sirup was not influenced and the quality as determed by color, sedimentation and crystallization is actually improved.

14. New technique speeds sugar-beet breeding: The sugar beet is typically a biennial plant, producing abundant foliage and a heavy root in the first season, and developing flowers and seed in the second. This life cycle tends to slow the work of the plant breeder. By the use of greenhouse cultures, artificial cold storage, and supplemental light, the breeder has been able to shorten the life cycle of the sugar beet. Cooperative investigations with the Colorado Agricultural Experiment Station have shown that by giving proper cold induction to plants that are a few weeks old (imitating winter exposure of plants), followed by a growth period with daylight supplemented by extra hours under incandescent lights (imitating the increased day-length of the spring and early summer months), the sugar beet may be made to complete its life cycle in 6 months. Furthermore, under this method 100 percent of the plants go to seed, forestalling any trend toward selecting annual or quick-flowering types. The new method will greatly

30505—53—pt. 2——32

facilitate the work of the plant breeders, but will increase the burden on field testing work.

15. Breeding lines of burley tobacco in advanced stages of development show promising results: (1) A new selection, similar in its adaptation and growth habits to the widely grown Kentucky 16, produces less of the red noncigarette leaf grades in the upper part of the plant and is root-rot resistant. It is being increased for release at an early date. (2) Three other lines combine resistance to wildfire, mosaic, and root rot and in 1951 showed yield, grade, and returns per acre fully equal to the standard varieties in the absence of disease, and much superior in the presence of the diseases mentioned. Manufacturer evaluation of cured leaf samples of these lines has been satisfactory. (3) Two other lines are moderately resistant to black shank. Extensive tests are in progress with all of these selections. This work was conducted in cooperation with the Tennessee Agricultural Experiment Station.

16. New sesame varieties being developed for machine harvest: The possibility of developing the sesame crop as a source of edible oil and protein feed depends upon the degree to which the nonshattering character can be combined with the desirable characters of present commercial strains (which shatter) so that the crop can be cheaply harvested by machinery. After two seasons of breeding work, several new lines have been developed which have a good seed type and possess large, well-filled capsules which do not shatter their seed. While they are far superior to any nonshattering sesame previously tested, further improvement be made in earliness, seed yield, and plant type before a variety can be released for commercial production. This work is carried on in cooperation with the Texas and South Carolina Experiment Stations.

17. Advance made in finding selective weed killers: 2,4–D and other chemicals used as weed killers are effective against broad-leaved, weedy plants but do not kill grassy plants. Farmers need herbicides which are selective to the needs of particular crops. A family of chemical compounds has been found—the carbamate derivatives—which are very selective in their herbicidal action, depending upon the arrangement of the various atoms in the compound. By adding chlorine to the No. 3 position on the benzene ring, a compound is produced that kills germinating crabgrass. By adding other atoms at other positions; other compounds are produced that kill mustard and pigweed. In greenhouse experiments, the compounds have caused little or no damage to cotton, the crop in which these weeds generally cause trouble. Extensive field tests of the compounds will be undertaken.

HORTICULTURAL CROP INVESTIGATIONS

Research is conducted on (1) production and improvement of fruit, vegetable, nut, and ornamental crops, (2) development of economical methods of handling, transporting, and storing fruits and vegetables so as to maintain quality and control diseases, (3) introduction and testing of new plant materials, (4) control of nematodes causing crop damage, and (5) plant disease epidemics and the development of information and methods to aid in their control. The horticultural crops include the great health protectors in our diet and are highly important staple food sources. For the 1952 crop or marketing year, they had a total farm value of approximately $3.4 billion.

Selected examples of recent progress

1. Several new improved fruit varieties and one almond developed in the breeding program were released during the calendar year 1952. The Hiland and Redcap cling peaches both have short chilling requirements so both are adapted to the southern range of peach production. Hiland is about 5 days earlier than Dixired; Redcap is 3 to 4 days later than Hiland. Both are highly colored, of good quality, and fill a need for very early peaches for growing in the extreme south. Ranger is a large freestone peach which ripens 3 weeks before Elberta. It is resistant to the important bacterial spot disease. The Prairie Gold, Stephens, and Custer apples and Heart River crabapple were developed at the Mandan, N. Dak., station. They are extremely hardy and adapted to northern prairie conditions. Dwarfrich cherry developed at Cheyenne, Wyo., is an extremely hardy sour cherry. The plant is semidwarf and the fruit quality is good. Earliblue, Bluecrop, and Herbert blueberries developed cooperatively with the New Jersey Experiment Station, are all of superior color, quality, and size. They should have important places in the rapidly developing blueberry industry. The Davey almond developed in cooperation with the California Experiment Station, produces attractive light-colored nuts with thin, well-sealed shells. It has proved a consistently good producer in extensive tests. The Albritton

strawberry developed in cooperation with the North Carolina Experiment Station, is large, glossy, productive, and is already being extensively planted in North Carolina.

2. Initial tests suggest antibiotics offer new approach to control of certain bacterial plant diseases: Bean plants that had been sprayed with solutions of streptomycin sulfate at 800 parts per million were inoculated later with bacterial blight. The antibiotic apparently entered the plant and prevented infection; it spread a short distance within the plant into some of the new leaves that developed after spraying, thereby protecting them against infection, but this protection did not extend to new growth produced far beyond the leaves and parts of stems that were sprayed. Although purified streptomycin is much too expensive for use on crop plants, these results suggest the possible use of crude preparations that might be economically feasible. In other tests, streptomycin, aureomycin, chloromycetin, and terramycin suppressed the growth in cultures of the bacteria causing bacterial spot of stone fruits and fire blight of pome fruits, but bacitracin and penicillin were not effective.

3. Quick decline or Tristeza disease of citrus has been found in Florida at several locations: This disease largely destroyed the citrus orchards in South America. The disease is in California, but the strain is slower in spreading and generally somewhat milder than that in South America. The strain in Florida appears to resemble that in California in its rate of spread and effect on the trees. State and Federal industry and control agencies have been notified.

4. Fertilizer formulations and recommendations for the citrus industry in Florida are being modified largely as a result of citrus fertilizer research of the past 5 years. This will result in much less superphosphate, some less potash, and somewhat more nitrogen being applied. The quantity of minor elements, particularly copper, is being reduced. This results in a less expensive and more satisfactory fertilizer for growers and reduces the use of such critical materials as superphosphate and copper.

5. Rapid progress made in finding virus-free strawberry plants: Previously virus-free plants had been found in 14 strawberry varieties, but in 1951 virus-free plants of 16 additional varieties were found and are being propagated for foundation stocks. Virus-free plants of most varieties are more vigorous and produce more runners, runner plants, and fruit than infected ones, and some virus-free plants survive the winter better than infected ones. Propagation of virus-free plants has been speeded by the use of electric lights in greenhouses in winter. The use of lights at midnight for 20 minutes to 2 hours stimulated strawberry plants to make runners rather than form fruit buds. Thus a single virus-free plant obtained in the fall could be put under lights in the greenhouse and by spring produce as many as a hundred plants. Virus-free foundation stocks of several varieties have been supplied to commercial plantsmen who are increasing them under conditions to prevent reinfection.

6. Thinning the stand of pecan trees is profitable: A longtime experiment in the Shreveport, La., area shows that 16 years after thinning a stand of 31-year-old pecan trees the net returns per acre from trees spaced 93 feet apart on the diagonal (5 trees per acre) have been the same as from trees spaced 67 by 65 feet (10 trees per acre). Also, the unthinned trees are showing more and more signs of deterioration; the tops are becoming progressively smaller, the foliage is not as healthy, and the trees need more and more fertilizer. The incidence of disease and insect pests is greater and control is much more difficult and expensive in the unthinned portion of the orchard than where the trees are adequately spaced.

7. Cold injury to tung trees reduced through research: A considerable loss to the tung crop was caused by a sudden freeze in November 1950, which caught the trees before they had shed their leaves and killed many of embryonic blossom buds from which the 1951 crop would have developed. Several varieties being developed in the breeding program showed exceptional ability to produce fruit in spite of the adverse weather. Two varieties, F–555 and L–47, bore full, or practically full crops notwithstanding this severe fall freeze and if all the tung orchards in the southern United States had been planted to these two varieties, the losses from cold injury might have been reduced 50 percent. Nutritional experiments at Gainesville, Fla., showed that tung trees that had received a low level of zinc had an average of 58 percent of their total shoot growth killed by cold, while those that had received the highest level of zinc lost only 21 percent. Potassium was also effective in reducing injury, but only where zinc was supplied at a high level. Zinc deficiency in tung orchard soils is general in the eastern tung-producing area and somewhat less common in the western area. Most growers now apply some zinc regularly in their fertilizers and it is believed that it would be profitable for them to increase the amount.

8. Kennebec potato immune from the common races of late blight: In 1951, rain interfered generally with spraying operations in Maine and heavy losses from late blight occurred in susceptible varieties. Thousands of acres of Kennebec, however, were grown without spray, and in only a few instances was late blight found on it. The certified seed of Kennebec increased from 200 bushels in 1948 to 1,868,461 bushels in 1951.

9. Sprout-inhibiting compound promising on stored potatoes: Research with a new sprout inhibitor for potatoes (3–C1–IPC) showed that this chemical is outstanding in comparison with other growth regulators commonly used for this purpose. Tubers treated with this compound in suitable amounts and stored continuously at 70° to 75° F. for 5 months were relatively firm and without sprouts.

10. Methods developed for colder transit temperatures for Florida sweet corn: Sweet corn must be cooled quickly after harvest and refrigerated properly in transit to preserve good table quality. In tests with hydrocoolers now used in Florida the temperature of crated sweet corn was reduced from about 80° F. to 50° F. in 30 minutes. More thorough cooling until the corn reached 40° F. would be desirable for maintaining quality. Top-iced corn cooled faster and maintained a more uniform temperature in transit in fan cars than in nonfan cars. All parts of the load in fan cars reached 40° by midnight of the day after loading and remained between 35° and 40° ,whereas the load in the nonfan cars was above 45° during the entire transit period.

11. Sealed polyethylene and Pliofilm liners reduce wilting of apples packed in cell-type fiberboard cartons. These cartons, which are being used in increasing quantities for apples in the Northwest, give good protection against bruising, but excessive shriveling is frequently encountered. Experiments show that use of sealed polyethylene (type 150) or Pliofilm (FM80 and H. P. 100) liners in the boxes reduced wilting and softening and enhanced the appearance and dessert quality of the fruit during extended storage at 31° F. Approximately 7,000 cell-type boxes of Golden Delicious apples with sealed plastic liners were used successfully by commercial packers during the past season.

12. Promising new vegetable varieties introduced: During the calendar year 1952 Granex, an outstanding yellow onion hybrid and Crystal Hybrid, a white variety, were introduced in cooperation with the Texas Agricultural Experiment Station. Both are highly productive and represent accomplishments of longtime efforts to produce commercial hybrid onion varieties. Both are being planted commercially as rapidly as seed becomes available. Badger Market, a new yellows-resistant cabbage developed in cooperation with the Wisconsin Experiment Station, is resistant to head bursting and is early, of high quality, and appears to be widely adapted. Fairfax watermelon, comparable to Congo in resistance to anthracnose and to fusarium wilt, is highly productive, of dependable quality, and does not develop hollow heart. It was developed at the Regional Vegetable Breeding Laboratory, Charleston, S. C. The tomato variety Homestead introduced in cooperation with the Florida Agricultural Experiment Station, has been outstanding for the winter crop in southern Florida. Several thousand acres are being grown during the 1952-53 winter season. Topcrop and Contender varieties of snap bean introduced 3 years ago, have both become important varieties in commerce. Both are resistant to the important common mosaic virus disease.

13. Ornamental plant varieties introduced during 1952 have included 19 new azaleas developed at the Plant Industry Station, Beltsville, Md., 2 very hardy, early blooming chrysanthemums developed at the Cheyenne Horticultural Field Station, Cheyenne, Wyo., 3 garden chrysanthemums developed at the Plant Industry Station and a variety of column stock developed at Beltsville. Young plants of this variety can be sorted for single and double flowers at the seedling stage, thus permitting florists to select and grow only the desirable doubles.

14. Plant introductions during the past year totaled 5,600 varieties or strains of plants and seeds. Completion of exploration in Ethiopia resulted in 1,600 collections of which about 500 were wheats and barleys of much interest to breeders as possible sources of resistance to strains of wheat rust now seriously affecting our commercial varieties. A special collection of beets from Turkey should prove important to sugar-beet breeders. An exploration in the Patagonian area of South America for grasses and legumes which may be useful for our intermountain range lands has also been completed, and an expedition for grass and legume plants is still in progress in Turkey and South Africa. In the year ended June 30, 1952, 72,824 plants or seed shipments were sent from plant introduction stations, both Federal and cooperative, to State experiment stations, nurserymen, and others.

15. Recent valuable plant introductions include a soybean obtained from China, from which the variety Clemson Nonshattering, has been developed. Clemson Nonshattering is resistant to the bacterial-pustule disease, a production hazard in Southern States. The new Caliverde variety of alfalfa, released in California, carries wilt resistance found in an introduction from Turkistan. Progress is being made in obtaining resistance to Hessian fly through the use of barleys brought in from Spain, Russia and North Africa. The lettuce variety, Parris Island, has been developed from an introduction obtained in Turkey in 1939. It is resistant to a virus disease which stopped the production of Cos or Romaine lettuce around Beaufort, S. C. This was formerly a profitable industry, and the new variety promises to restore this crop to South Carolina.

FOREST DISEASE INVESTIGATIONS

Losses from forest diseases approach or exceed the losses from fire. Research is conducted to develop methods for preventing or controlling diseases on the millions of acres of national forests, parks, and other timbered areas, diseases of shade trees in public parks, streets, and other areas, and disease and decay of forest products. The information developed serves the Forest Service and other governmental bureaus, State forestry agencies, municipalities, and private owners, and these agencies cooperate in the investigations. The work consists primarily of (1) identifying diseases of forest trees and products and determining their life cycles, and (2) developing effective and economical control methods and management practices and disease-resistant varieties.

Selected examples of recent progress

1. Dutch-elm disease and phloem necrosis of elms continue as important shade tree disease problems. Major research emphasis is being placed on disease-resistant seedlings. Over 11,000 American elms, 2 to 6 feet tall, have been tested for resistance to Dutch elm disease. Of these, 85 survived the first year tests and will be further tested. To avoid the delay incident to growing thousands of seedlings 1 or 2 years in seedbeds and then 1 to 3 additional years in nursery rows before testing, mass inoculation methods have been developed that can be used on first year seedlings. This new procedure should speed the testing work. Survivors of these inoculation tests will then be tested for resistance to phloem necrosis.

2. Pulpwood losses can be reduced by following practices developed through research. For storage periods longer than 2 to 3 months in the summer, or 4 to 6 months in the fall and winter, it was found that progressively greater decay losses would occur in unpeeled pulpwood, and that peeling reduces decay loss. The reverse is true for shorter storage periods when peeled pulpwood decays more rapidly than unpeeled. Practices that would reduce deterioration of peeled pulpwood include hastening the drying by increasing the air circulation around bolts, favoring small or split bolts for storage, and spraying or dipping the bolts in a fluorine solution shortly after peeling. It was found in the Northeast that butt logs of balsam fir with heartrot, often rejected as likely to sink in river transport, float well over a period of 2 years while infected logs from the upper part of the tree are more likely to sink and be lost. Beech, which is very decay susceptible, should be separated from other species and stored in water or under wet hay.

3. A preliminary study was initiated of a widespread dying and decline of aspen in the Lake States. A fungus, *Hypoxylon pruinatum*, is associated with the diseased trees but its exact role in relation to other contributory factors is not known. Stand density is the only factor yet studied that seems to be correlated with incidence of cankers. Because thin stands have more cankers than thick stands, silvicultural methods that will maintain thick stands may reduce damage from the disease.

SOILS, FERTILIZERS, AND IRRIGATION AGRICULTURE INVESTIGATIONS

Research is conducted in the following related fields:

Soil improvement, management, and irrigation agriculture investigations, including research in soil and crop management and in water management on farms related to crop production. Fertilization, liming, tillage, crop rotation, and other production practices, are studied at approximately 66 field locations in dryland, humid, and irrigation regions and are supported by basic laboratory investigations into soil-plant relationships, including studies of tilth, soil conditioners, moisture, fertility, and soil organisms. Salinity problems related to soil and crop management are also studied.

Fertilizer, liming material, and soil amendment investigations to improve the properties, efficiency, and availability of these materials to plants. Farmers now use annually approximately 48½ million tons of these materials having a retail cost of more than $900 million.

Basic research regarding the effects upon plant nutrition of various mineral elements and growth factors in the soil, and through plants used as food, the effect of these elements on animal and human nutrition.

The whole soils program is closely integrated with the soils work of State agricultural experiment stations, the Soil Conservation Service, Bureau of Reclamation, and other Federal agencies. Such integration and cooperation facilitates effective planning and research on the most urgent problems.

Specific problems to which efforts are being directed include:

1. Development of processes for treating various grades of phosphate rock with mixtures of phosphoric acid, available from the uranium recovery program, and sulfuric acid in the preparation of high analysis superphosphates.
2. Improvement of mixed fertilizers of higher analysis by granulation to better the properties affecting packaging, storage, and availability of nutrients to plants.
3. Evaluation of plant nutrient qualities of higher analysis fertilizers resulting from the program of expanded fertilizer production.
4. Increased production of feed crops in the South through better fertilizer practices and cropping systems.
5. The development of improved soil management and crop production practices for newly irrigated lands such as are being developed in the Columbia, lower Colorado, Missouri, and other river basin areas, and also for the older irrigation projects.
6. More accurate determination of the availability and use of nutrient materials by plants by use of radioactive materials.
7. Determination of the fertility needs and management practices for maintaining and improving productivity of dryland areas where fertility levels are now declining.
8. Improvement of the nutritive value of plants for human consumption and as a means of avoiding nutritional troubles in animals by studying the effects of fertilizer applications and other variables on the vitamin and mineral content of plants.

Selected examples of recent progress

1. Use of fertilizers sets new record: The year ending June 30, 1951, was the twelfth successive year that fertilizer consumption set a new high in the United States and territories. The 20,988,740 tons of fertilizer used in that year (an increase of 14.4 percent over the previous year) contained approximately 1,238,000 tons of nitrogen, 2,108,000 tons of phosphoric oxide (P_2O_5, and 1,380,000 tons of potash (K_2O). The trend toward higher-analysis fertilizers continued and the average percentage of plant nutrients in mixed fertilizers increased from 23.24 to 24.19 percent. Higher analysis fertilizers save on the cost of handling the inactive ingredients. A study of representative mixed fertilizers marketed throughout the country, showed that the manufacturing and distribution costs of inactive ingredients in the 12 million tons of mixed fertilizers in 1949–50 were $22 million, or $1.83 per ton. A considerable proportion of these costs could be saved if consumer purchases were limited to those grades which can be formulated without excessive use of liming materials and inert matter. Continued improvement in quality of fertilizers and their more efficient use by American farmers are among the ways in which research is contributing directly to increased production of agricultural commodities.

2. Superphosphate manufactured in 202 plants: A detailed survey of the superphosphate and wet-process phosphoric acid industries in the United States was made in cooperation with the Production and Marketing Administration. The production capacity for normal superphosphate was 16½ million tons in 202 plants located in 32 States and operated by 85 companies. Nearly 97 percent of the production was from Florida phosphate rock. Production capacity for triple superphosphate was 793,918 tons in 9 plants operated by 8 companies.

3. Industrial "spent" acids useful in fertilizer manufacture: Greenhouse tests of phosphate fertilizers produced with spent sulfuric acid from the DDT and other industries showed that the "still bottom acid" from the first phase of DDT synthesis could be used safely in amounts up to about 12 percent of the sulfuric acid requirement. The "red acid" from the second phase of the DDT synthesis, however, proved injurious to plants.

4. Early diagnosis of potassium deficiency aids correction: Greenhouse studies of alfalfa production, cooperative with South Carolina, showed that incipient potash deficiency can be diagnosed from tissue analyses early enough to apply fertilizers and avoid loss of yields and stand. These findings are important to southern farmers in a changing agriculture which is based on increased forage production.

5. Response to fertilizers increasing in dry-land region: Widespread tests during the past year show that in many areas of the dry-land region, nutrient supply is becoming an important limiting factor in crop production. At Mandan, N. Dak., corn on spring-plowed land yielded 34 bushels with manure applications and 20 bushels without manure and wheat yields varying from 12 to 30 bushels were correlated with the amount of nitrogen, in the plant and soil. In 7 experiments located in 6 States, yield increases of 10 bushels of wheat per acre, or 42 percent over unfertilized plots, were obtained at 4 locations from applications of 25 pounds of nitrogen. The protein content of grain was increased at all locations.

6. Zinc deficiency corrected in Columbia Basin: Research cooperative with the Washington Agricultural Experiment Station in 1951 and with the Bureau of Reclamation in 1950 showed that the major irrigated soils in the Columbia Basin are zinc deficient. Zinc sulfate was applied commercially to 5,000 acres of beans in the Yakima Valley. Spray applications proved more effective than applications of zinc to soils. Zinc deficiencies are not conspicuously evident in the foliage but yields of beans, corn, and alfalfa have been increased significantly by the use of zinc sprays. Intensive studies at Beltsville, Md., on the role of zinc in plant nutrition showed that on soils treated with zinc, the young tissue of plants was higher in zinc in the early stages of growth, but in later stages the reverse is true. This indicates lack of free translocation of zinc in the corn plant, where it is present chiefly in the region of the nodes.

7. Alfalfa hay yields doubled on Yuma Mesa: In experiments cooperative with the Arizona Agricultural Experiment Station, the Soil Conservation Service, and the Bureau of Reclamation on the Yuma Mesa in Arizona, alfalfa hay yields were increased twofold on sandy soils by judicious use of irrigation water and phosphate fertilizers. The total water required for these high yields is less than that applied by the average farmer, but the frequency of application was greater. The application of 400 pounds of phosphate (P_2O_5) per acre at planting followed by annual applications of 100 pounds appeared adequate for large yields during the life of the alfalfa stand.

8. Irrigation water application efficiencies affect crop yields: In studying the irrigation water application efficiencies in the lower Rio Grande Valley it was found that grades of less than 0.20 percent consistently produced the greatest yield of cotton per acre. The greatest yield of cotton was produced on the system which had a gradient of 0.02 percent on a deep, medium textured permeable soil. The uniformity of the distribution of the irrigation water appeared to be the important contributing factor to this yield of 3.34 bales of cotton per acre. These results show that the ultimate success of any system depends upon the adjustment of the irrigation head to fit the field conditions at the time the water is being applied. Tillage practices in particular, can strongly influence the head requirements by changing the coefficients of roughness, travel time, and rate of intake of water into the soil.

9. A study of the water requirements for irrigation show that consumption of water can be reduced: Investigations in the Missouri River Basin showed that applying irrigation water when the upper 2 feet of soil contained 50 percent of its water-holding capacity, produced no significant differences in yields of alfalfa and corn over the practice of applying irrigation water only after 85 percent of the available water supply in the upper 2 feet of soil had been used. The consumptive use of water on plots in alfalfa maintained at high-moisture content was 24.44 inches while it was only 20.48 inches for the low-moisture level plots. Likewise, the consumptive use of water on the high-moisture plots in corn was 17.70 inches as compared with 12.75 inches for the low-moisture plots. This shows that wastage of available irrigation water supplies can be avoided by proper application of water.

10. Control of erosion due to wind studied effectively with wind tunnels: At Manhattan, Kans., wind tunnel studies of the flow patterns of wind over model barriers and windbreaks have yielded marked contrasts. In general, the sharper the barrier the greater is the magnitude of protection behind it. Rounded shapes have a lesser zone of influence than narrow vertical shapes. The porosity of a barrier was found to decrease the degree of protection downwind but at the same time extended its zone of influence.

Portable wind tunnel studies made from the Manhattan headquarters on plots located at Scottsbluff, Nebr., demonstrated the effectiveness of legumes in reducing the wind erodibility of irrigated soils. Land in potatoes after 40 years of cropping to a 3-year sequence of potatoes, beets, and barley, eroded 74,000 pounds of topsoil an acre in the spring of 1951. Where 3 years of alfalfa had been incorporated in the crop sequence, the soil erosion from land in potatoes was only 970 pounds an acre. Studies near McPherson, Kans., in the spring of 1951 showed land cropped to wheat continuously to be 4.4 times as erodible as wheat after second year sweetclover. The yields upon harvesting were 19 and 45 bushels an acre, respectively. These figures demonstrate the immediate economic feasibility of reducing the erosion hazard.

11. Mulch tillage reduces erosion, conserves soil moisture and increases yields: At McCredie, Mo., the corn stalks remaining from the 109-bushel-per-acre yield of corn in 1950 were shredded to provide a surface mulch for corn planted in 1951. The application of this mulch reduced the soil loss from the 1951 crop to 91 percent less than that from the first-year corn which had been planted on plowed meadow sod. The runoff from the second-year crop was 38 percent less. In preceding years, when both corn plots were plowed, soil loss under second-year corn was 60 percent more and runoff 12 percent more than under the first-year corn.

At Clemson, S. C., the use of mulch tillage methods for erosion control on plots of corn, following a cover crop of vetch and rye, resulted in reductions in runoff and soil loss of more than 80 percent during the corn-growing season. Yields of corn from the mulch-tilled land were 12 to 15 percent greater than those from land where the cover crop was plowed under. On a plot of mulch-tilled cotton, following a cover crop of kobe lespedeza in wheat stubble, there was produced 1,347 pounds of seed cotton per acre as compared with 890 pounds where cotton was grown each year without any cover crop.

Results of studies initiated 3 years ago, in cooperation with the Ohio Agricultural Experiment Station, show that mulching corn land with manure after the corn is planted reduced erosion to one-thirtieth of that measure from conventional corn culture where the manure is plowed under preceding planting. Water loss was reduced nearly one-half by manure mulch. Yields from the manure mulched plots have equaled those of conventional culture and in the dry summer of 1951 manure-mulched corn significantly outyielded unmulched corn by 11 bushels per acre.

12. Supplemental irrigation in South increases yields: On a pasture-irrigation study at Lewisburg, Tenn., 24.33 inches of water was applied to the irrigated pasture during the grazing period of April through October 1951. Rainfall during this period was 20.01 inches. The cost of irrigation was $59.67 per acre or $2.45 per acre-inch. The irrigated pasture in this study supported 292 cow-days per acre while a comparable unirrigated pasture supported only 198 cow-days per acre. The increased milk production paid a net return of $121 per acre more on the irrigated pasture than from the unirrigated pasture after all costs attributal to the irrigation were paid.

Studies conducted at Clemson, S. C., reveal that supplemental irrigation has increased the yields of forage crops by 100 to 138 percent. Fescue grass and ladino clover yields were more than doubled during a period of 5 months when 7 inches of additional water was applied. Corn yields were increased 300 to 600 percent by supplemental irrigation.

At Watkinsville, Ga., irrigation of corn on an upland site produced a yield of 73.4 bushels per acre whereas unirrigated corn yielded only 50.2 bushels per acre. Similar studies on cotton irrigation at this station showed a net increase of 363 pounds of cotton per acre, or 16.7 percent over cotton land that was not irrigated.

13. Terraced orchards successful in conserving soil: At Clemson, S. C., it has been found that in spite of an average annual rainfall of 54 inches, no erosion or runoff of any consequence has occurred for 11 years in a completely terraced orchard, i. e., where a terrace was constructed for each tree row. When, in addition, winter cover crop residues were effectively converted into a surface mulch, the rate of moisture infiltration was increased to the point where all soil movement was eliminated. What was formerly a farm crop promoting the most rapid destruction of soil, now has become one that both conserves and improves the land it occupies, through the adoption of practical conservation practices. Orchard terracing involving complete moisture conservation plus adequate fertilization and good cover crop management has also eliminated need for most, if not all, tillage formerly considered necessary in a commercial peach orchard.

14. Better methods for diagnosing phosphorus needs in western soils: In cooperation with other Federal and State agencies, better procedures for diagnosing phosphorus needs in western calcareous soils have been developed. Combined field and laboratory studies showed that the amount of phosphorus held on the surface of calcium carbonate and other soil surfaces is closely related to the available phosphorus in calcareous soils. These results represent definite progress in solving complicated and little understood phosphorus fertility problems in the irrigated sections of the West.

15. Comprehensive study of aerobic sporeforming soil bacteria published: The latest and most authoritative information available on this important genera of bacteria is a taxonomic study of 1,134 aerobic sporeforming bacteria which divides the bacillus into 3 groups on the basis of morphology and physiology. A major contribution to this field is a key for identifying cultures by which 2 characters instead of 1 are used at each separation. The publication will be of great value as a standard reference for teachers and research workers in this field.

16. Chlorosis may be diagnosed by enzyme studies: Studies at Beltsville, Md., on the enzymatic activity of plants in relation to minor elements show that a good indication of the availability of certain minor elements, copper and iron, may be the activity of certain enzymes in the plant. Soil cultures using varying proportions of calcareous and organic soils and soils with different quantities of applied lime and nutrient cultures with varying contents of iron, copper, and manganese were included in these experiments. With Connecticut broadleaf tobacco and several other crops, a deficiency of copper was associated with a low level of the enzyme, ascorbic acid oxidase. A deficiency of iron in plant metabolism was associated with a low level of catalase, an iron enzyme. Not all plants reacted in the same manner. Spring wheat, for example, did not show iron deficiencies on calcareous soil but did show extreme copper deficiencies. It is evident that some plants are more sensitive to iron deficiencies than to low levels of available copper, whereas in other plants the reverse is true.

17. Radioactive calcium investigations initiated: Cooperative studies with North Carolina on plant utilization of calcium from fertilizer applications were initiated using radioactive calcium. Results indicate that uptake of calcium by tobacco plants was greater from monocalcium phosphate than from either calcium sulfate or calcium carbonate, even though less calcium was applied as the phosphate than as the sulfate or carbonate. The percent of the tobacco plant's calcium originating from each fertilizer reached a maximum at 31 days after transplanting, then declined steadily throughout the rest of the season. Band applications 3 inches to the side of the plant resulted in unequal distribution of the fertilizer calcium in the plant with larger fractions in the side of the plant above the band. Investigations with radioactive calcium also showed that there is very little movement of calcium in the soil. Soil samples taken at a 4-inch depth underneath the band of applied radioactive calcium and samples taken from 3 inches to the side showed no radioactivity at the end of the growing season after 14.5 inches of rain.

18. Synthetic soil conditioners improve soil structure: During the last year a large number of soil aggregating agents (conditioners) such as polyacrylonitriles and other synthetic compounds have appeared on the market under a variety of trade names including Krilium and Aerotil. This has caused a tremendous volume of inquiries on their value in agriculture. Preliminary tests of a number of these materials indicate that they are highly effective in improving and maintaining good structure of soils having appreciable amounts of clay. Alkali soils of low permeability were greatly improved by these materials, and crop yields were also increased largely through a better supply of moisture to the plants as a direct result of improved soil structure. Research on the use of these new materials in agriculture is being continued to determine their value under various soil conditions.

19. Nutritional troubles with cattle related to forage deficiencies: Laboratory studies were made of 342 samples of timothy hay from St. Lawrence and Franklin Counties, N. Y., where nutritional troubles with cattle have occurred. Only three samples contained more cobalt than the minimum required for maintenance in cattle, about one-third of the samples contained minimum amounts of cobalt, and the remaining two-thirds had less than the minimum needed. Copper was also deficient. It appears that both cobalt and copper are critically limited in most of the forages of this area for good nutrition of dairy cattle.

This research is conducted in the following four major fields:

Farm-machinery investigations are concerned with the improvement of farm machinery, equipment, and mechanical methods of planting, cultivating, fertilizing, and harvesting farm crops, and combating their insect pests and diseases through the establishment of fundamental machine principles and the determination of basic performance requirements. Principal objectives are to increase production, improve quality, and reduce labor requirements, and thereby costs, in the production and harvesting of staple and specialized crops.

In the past 10 years farmers have changed from hand methods and animal power to machines more rapidly than in any other decade in history. They are using more than twice as many tractors as in 1942. Mechanization is far advanced in several crops, such as small grains and corn, but cotton, tobacco, tree fruits and nuts, and other crops including many of the vegetable crops, still require large amounts of hand labor. More mechanization is greatly needed.

Farm structures and related investigations develop more effective structures for producing livestock and for conditioning and storing farm crops, and improve the design and utility of farmhouses. The farm investment in buildings, including houses, is approximately $20 billion and farmers spend annually about $2 billion for new buildings, repairs, and improvements. Structures for part-year storage on the farm for most grain, feed, and perishable crops are essential to orderly marketing of agricultural products. Well planned and equipped buildings for livestock greatly reduce chore labor.

Mechanical processing of farm products research is concerned with the improvement of equipment and methods for handling and processing products on the farm or at local processing plants. Current studies are concerned with improving the ginning of cotton; processing kenaf, ramie, sansevieria and fiber flax; the preparation of poultry and livestock feed; increasing labor efficiency and reducing mechanical injury in handling and packaging fresh fruits; and the development of labor-saving machinery for preparing fruits and vegetables for freezing in locker plants and for canning in community canneries.

Farm-electrification investigations are directed toward developing new applications for electric energy that will increase the productive capacity as well as the quality of production of farms of the United States, more than 88 percent of which are connected to rural electric lines. Such investigations include the application of electrical energy in the forms of power, heat, visible light and other radiation. Of particular interest are new and improved electrical devices and machines for animal production, insect control, crop handling and replacement of labor on farmsteads.

Selected examples of recent progress

1. More plans prepared for low-cost farmhouses: Four additional plans with complete working drawings and perspective renderings, for use in Farmers Home Administration plan catalogs were completed. These make a total of 12 that have been finished for use in the loan program administered by that agency. The plans are also available to farmers generally through the state extension services. Three low-cost, expansible, experimental farmhouses have been completed at the Agricultural Research Center and will be used by dairy workers. They incorporate many new ideas in structural design and construction materials.

2. Drying corn, small grains and forage crop seeds: Information obtained from continued studies of mechanically drying corn, small grains and legume and grass seed on the farm, has made it possible to furnish up-to-date recommendations on air-flow, power and equipment requirements, and equipment and operating costs, for both unheated- and heated-air drying. Four well-illustrated leaflets on farm drying of ear and shelled corn and small grains were published to make this information available to farmers, particularly in the North Central States. These publications also illustrate the most up-to-date methods of adapting existing crop storage structures for drying and describes the modern types of driers and drying bins and buildings which are available commercially.

In the southeastern area, early harvest coupled with the drying and storing of shelled corn promises to be a good method of handling this crop. Advantages include reduction in insect infestation and weather damage, completion of corn harvest prior to peanut or soybean harvest, and early preparation of land for fall grain or winter cover crops. It has been estimated that Georgia farmers alone lose about one-third of all the corn they produce due to insects, rodents, and spoilage caused by late harvest and improper drying and storage. In 1951 these losses

cost Georgia farmers about $25 million. Much of this loss could be avoided by the use of current research results which show proper drying and storage methods.

Several drying bins or compartments have been designed for farm drying both grain and seed crops including rescue and fescue grass, crimson clover, and lespedeza. Additional tests have been made to determine the resistance of these seeds to air flow. Results from these tests make it possible to develop more efficient seed-drying systems.

Recent tests in cooling and aerating stored grain show that smaller air flow rates than the one-tenth cubic feet per minute per bushel previously thought necessary are sufficient to do a satisfactory job of controlling moisture migration which is often responsible for considerable spoilage and insect activity. Rates as low as one one-hundredth of a cubic foot of air per minute per bushel were effective permitting the use of fractional horsepower electric motors for cooling grain in bins as large as 10,000 bushels. With such equipment a unit can be used on each individual bin with several units on one electric circuit and controlled with one switch as one thermostatic control. Vertical tubes show promise of good performance, are cheaper, and easier to install than perforated floors or floor ducts.

3. Mechanical cooling of stored grain preserves quality: At Ames, Iowa, effective cooling of shelled corn in 3,000 and 10,000 bushel bins was accomplished at low cost with fractional horsepower motors and small fans. A 4-inch pipe, with the lower 20 inches perforated, was inserted vertically at the bin center and a fan connected at the top to exhaust the air from the bin. A one-third horsepower motor and fan can cool the grain in 3 or 4 days sufficiently to prevent moisture migration and stop insect activity.

4. Sugar beet production equipment improved by two new devices: An experimental press wheel for the sugar beet planter was designed in 1949 and tested in Michigan for 3 years. Its use results in the production of about 20 percent more seedlings per pound of seed than obtained with the commercial press wheel used as a check. The new press wheel has shown marked superiority under adverse seedbed conditions.

A machine for thinning and weeding sugar beets in one operation has been developed. Tests have indicated that at least 30 percent of the hand-thinning labor can be eliminated by the use of this machine.

5. Sugarcane harvester improved to reduce trash in harvested cane. With the completely rebuilt and improved sugarcane harvester the trash content of the harvested cane was reduced considerably below that now attained with standard equipment. Studies have shown that the combined savings to grower-processors would average from $1.20 to $2.05 per gross ton of cane, depending on field conditions, by delivering clean, fresh cane to the mill instead of cane cut by present methods. The weight of the harvester was also reduced and a loading arm was provided for rear loading. Direct rear loading enables the harvester to open a field without the use of hand labor otherwise required when harvesting with the conventional side delivery cane cutter. During 1951, the experimental machine harvested approximately 100 tons of cane. It has an estimated capacity of 12 to 15 tons per hour which is sufficient for practical use and can also be equipped for either rear or side delivery.

6. Experiments in Iowa on the use of herbicides to control weeds in corn showed that a preemergence application of 2,4–D can be successfully substituted for the costly first mechanical cultivation. Postemergence herbicide applications were not a successful substitute for mechanical cultivations. They were less effective in weed control and depressed yields. Applying preemergence sprays in 10-inch strips directly over the corn row was as effective as preemergence spray applications made over the entire area with a saving of 75 percent in materials.

7. New applicator developed for chemical weed control in cotton: It levels the edge of the beds and shields the small cotton plants from soil thrown by the sweeps. Blueprints of this device developed in Mississippi were made and distributed to other research workers and to several manufacturers some of whom are considering building it for the market. Other spray equipment developments in Mississippi include improvements in nozzle arrangements on the cultivator spray rig for insect control.

8. Fertilizer placement studies were continued in cooperation with 19 State agricultural experiment stations and 8 implement manufacturers. In 1 of the field studies conducted in Michigan, with a planter fitted with special attachments fertilizer placed in a band 3 inches directly under onion seed increased the yield 264 bags per acre over that produced by drilling in the fertilizer with a grain drill. This improved practice can increase returns to the farmer by several hundred dollars per acre depending upon market price.

9. In cotton ginning seed cotton driers, many of which are of Government design, are now standard equipment in most gins. It is estimated that approximately 4 million bales will be processed through lint cleaners during the 1952–53 ginning season with an increase in market value of $12 million due to better cleaning. The automatic feed control which regulates the flow of cotton from the truck greatly reduces the overflow from the gin stands thus reducing damage from overdrying and excessive cleaning.

Improved cleaning machinery and controls are most important in maintaining the inherent good quality of the fiber and obtaining maximum returns from the crop. In addition to the seed cotton drier, other machines developed by engineers and cotton technologists which have helped in speeding up ginning operations and in maintaining quality include the lint flue cleaner and automatic feed to the gin system.

10. Electric light traps will capture cotton insect moths. In exploratory studies conducted in cooperation with the Georgia and Texas Agricultural Experiment Stations and the Bureau of Entomology and Plant Quarantine, eight different cotton insect species were captured. During the 4-month summer period each trap captured from 1,000 to 147,000 moths of each species. Studies initiated in south Texas have shown that moths of the pink bollworm are attracted to electric light traps. As the season advanced and the insect flight increased, several thousand pink bollworm moths were captured in each trap each night. These exploratory studies are showing that even though it may not prove practical to use the electric traps for complete control, they will be a very useful device for locating newly infested areas and properly timing the chemical control application to meet the critical flight periods of such insects.

11. Electric insect traps improved: Eleven traps of eight different designs were made at the Tobacco Branch Station, Oxford, N. C., and operated in cooperation with the Bureau of Entomology and Plant Quarantine. The type of trap found most effective for capturing hornworm moths was a mechanical-type trap 4 feet wide equipped with two 40-watt blacklight lamps. It consistently caught 4 times as many hornworm moths as a similar, but smaller trap 3 feet wide developed the previous year. Investigations of the attractiveness of lighted surfaces to European corn-borer moths, conducted in cooperation with the Iowa Agritural Experiment Station, showed that a large luminous area is a better attractant for several insects, including the European corn borer, than is a relatively small area with greater surface brightness. A surface covered with a sodium-yellow fluorescent paint was preferred to darker paints or to aluminum foil and white enamel surfaces.

12. Use of gas for fuel in curing shade-grown tobacco increases very rapidly: It is estimated that 85 percent or more of the growers in the Connecticut Valley used gas for fuel in 1952 in curing shade-grown tobacco. This results in part from investigations during 1950 and 1951 cooperative with the Storrs and New Haven (Conn.) Agricultural Experiment Stations. A comparison of gas as as a fuel for curing was made with charcoal. An increase in value of 45 cents per pound resulted from gas curing in 1950 and 30 to 35 cents per pound in 1951 Other factors are also responsible for the change, particularly saving in labor involved in tending fires and also lower fuel cost. There was, however, no significant improvement in quality of Habana seed or broadleaf tobaccos resulting from the use of gas for fuel as compared with charcoal, but there was a saving of $15 per acre in fuel cost.

13. Drying rice with dielectric heat was found to have some advantages over conventional systems. In cooperative studies with the Louisiana Agricultural Experiment Station rice dried with dielectric heat generally produced not less than 90 pounds of milled head rice per barrel, or about 7 pounds more than from rice of the same lot dried on the farm by the conventional system.

NATIONAL ARBORETUM

The National Arboretum occupies a site of approximately 400 acres in the District of Columbia. Basic developmental work has largely been done, and in recent years trees and shrubs have been transplanted from nurseries to permanent planting sites. However, much material is still maintained in nurseries awaiting transplanting.

A program involving estimated expenditures of approximately $2,400,000 for the long-term development of the needed roads, walks, buildings, and greenhouses was developed in 1947 in cooperation with the National Arboretum Advisory Council. This program, however, has largely been held in abeyance during the past 4 years as shown by the following tabulation:

Fiscal year:	Appropriation	Fiscal year—Continued	Appropriation
1948	$350, 000	1952	$38, 000
1949	328, 000	1953	38, 000
1950	70, 000		
1951	43, 950	Total	867, 950

During fiscal year 1952, there were the following activities at the National Arboretum:

Program for development of physical facilities

Development funds in 1952 were utilized approximately as follows:

Extension of water system and drainage	$5, 200
Roads and trails	12, 800
Grading and conditioning of areas for permanent plantings and transplanting from nurseries to field locations	20, 000
Total	38, 000

Considerable grading was performed near the main entrance to correct a swampy area. Fortunately, sufficient soil for the fill was obtained free of charge. Approximately 3 miles of road were widened and graveled and are now ready for surfacing. Trails were constructed in the azalea and holly areas. A very substantial start was made on the planting program for the central Ellipse area, the formal azalea garden was developed, and other areas were developed with permanent plantings.

Physical facilities now consist of a very attractive gatehouse at the main entrance (28th and M Streets NE.) which is being used as an office, 2 modern residences for employees, a series of temporary greenhouses, a number of temporary garages and storage sheds, a permanent implement storage building, a carefully designed water system to provide fire protection and irrigation to all points in the Arboretum, necessary sewage and power installations, 1½ miles of hard-surfaced road, about 3 miles of graveled road, and approximately 1½ miles of foot trails.

Operation and maintenance: The Woman's National Farm and Garden Association allocated approximately $500 for the purchase of planting material for the dogwood memorial planting. Other gifts included 96 varieties of crabapples and 31 varieties of flowering quince and were made by individuals, commercial nurseries, and organizations such as the American Association of Nurserymen.

Plantings now include over 70,000 azaleas, a formal azalea garden which will eventually contain specimen plants of all varieties that can be grown in the Washington area, an extensive planting of over 200 varieties and species of crabapples, a large planting of magnolia and holly species, and miscellaneous other plantings. The herbarium increases annually and now contains over 280,000 mounted specimens.

Public interest in the Arboretum continues to grow. Over 12,000 people viewed the azalea display during April and May of 1952.

Statement of obligations under allotments and other funds

[Includes only those amounts which, by Nov. 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases]

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, Agriculture (Bureau of Plant Industry, Soils, and Agricultural Engineering): Marketing research	$305, 229	$334, 500	$346, 000
Research on strategic and critical agricultural materials, Agriculture (Bureau of Plant Industry, Soils, and Agricultural Engineering): For research on the development and production of domestic crops providing strategic and critical agricultural products under sec. 7 (b) of the Strategic and Critical Materials Stockpiling Act of July 23, 1946:			
1. Research on domestic production of natural rubber	$107, 352	$108, 000	$108, 000
2. Investigations of domestic production of vegetable tannins	51, 553	53, 000	53, 000
3. Investigations on vegetable fats and oils	112, 696	116, 000	116, 000
4. Investigations on fiber plants	65, 537	88, 200	111, 500
Total, research on strategic and critical agricultural materials	337, 138	365, 200	388, 500

Statement of obligations under allotments and other funds—Continued

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Control of forest pests, Agriculture (Bureau of Plant Industry, Soils, and Agricultural Engineering): Forest Pest Control Act: Surveys to determine distribution and intensity of forest diseases and formulation of recommendations for control practices	$41,165	$105,500	$105,500
Flood prevention, Agriculture (Bureau of Plant Industry, Soils, and Agricultural Engineering): For assistance in connection with planning the agricultural phases of the development of river-basin programs	24,410	18,500	34,000
Operation and maintenance, Bureau of Reclamation (allocation to Agriculture) (Bureau of Plant Industry, Soils, and Agricultural Engineering): For soil management, irrigation, and salinity investigations in reclamation areas			100,000
Mutual Security (allocation to Agriculture) (Bureau of Plant Industry, Soils, and Agricultural Engineering):			
For administrative expenses incident to the investigations directed toward the development of rubber production in the Western Hemisphere	96,347		
For investigations of chestnut blight control programs in Italy	7,167	10,000	
Total	103,514	10,000	
Working funds, Agriculture, Plant Industry, Soils, and Agricultural Engineering, advanced from—			
Atomic Energy Commission:			
For improvement of soil management and crop production through investigations with radioactive isotopes	191,298	185,000	
Interior Department, Bureau of Reclamation:			
For chemical and physical analysis of soils and their relation to irrigation agriculture	9,000	9,734	
General Services Administration: For production of seed	392	602	
Department of Defense, research and development, Army:			
For research related to the formation of rubber in Hevea trees	14,950	20,000	
For services in breeding seed	13,693		
Services for special projects	11,354	90,600	
Department of Defense, procurement and production, Army:			
Services relating to fungicidal treatment of ammunition boxes	10,450	14,550	
Total, working funds, Agriculture, Plant Industry, Soils, and Agricultural Engineering	251,137	320,486	
Working funds, Agriculture, general (Bureau of Plant Industry, Soils, and Agricultural Engineering) advanced from—			
Corporate funds, Institute of Inter-American Affairs to cover expenses in connection with programs under title IV of the Mutual Security Act:			
For investigations directed toward the development of rubber production in the Western Hemisphere	362,453	324,085	
Department of State:			
To cover executive direction and administration, and general technical services incident to mutual security aid programs		49,500	
Economic and technical assistance, Asia and Pacific, title III, Mutual Security Act, executive (allocation to State): For scientific and technical support for Indian research in soils and fertilizers		31,500	
Department of Interior, Bureau of Reclamation: For studies in connection with an evaluation of the agricultural repayment feasibility of the Weber Basin reclamation project, Utah	120		
Department of Defense, Department of the Army: Preparation of strategic maps and map material	17,434		
General Services Administration: Production and acquisition of guayule seeds and seedlings on behalf of the national stockpile	89,871	60,573	
Total, working funds, Agriculture, general	469,878	465,658	
Working funds, Agriculture, Plant Industry, Soils, and Agricultural Engineering (trust account) advanced from—			
Reconstruction Finance Corporation: For research and survey activities relating to continuing and expanding abaca production in the Western Hemisphere	88,369	65,000	
Total, working funds	809,384	851,144	

Statement of obligations under allotments and other funds—Continued

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Miscellaneous contributed funds, Department of Agriculture (Bureau of Plant Industry, Soils, and Agricultural Engineering):			
Trust funds deposited by non-Federal agencies for cooperative research as follows:			
1. Improvement and management of turf grasses and control of weeds by chemical treatment	$3,038	$3,036	$3,000
2. Floricultural research on new methods of production and propagation		60	
3. Production of parent or foundation cottonseed to meet the need of the 1 variety program in California	8,363	8,100	7,700
4. Spinach, onion, and potato breeding and disease investigations	6,479	7,000	7,000
5. Research on phytotoxicity of insecticides and fungicides	292	1,000	1,000
6. Comparison of methods for accelerated tests of wood decay		5,300	5,300
7. Salt-meal feeding investigations	7,000	7,000	7,000
8. Cooperative soil-survey work with central and southern Florida flood-control district	22,731	14,269	
9. Brush control and range-improvement investigations	4,500	4,500	
10. Research into varieties of wheat resistant to stem rust	5,985	4,015	
11. Investigations on the effect of insecticides and fungicides on crop plants	1,436	4,000	4,000
12. Corrosion studies with pesticides on application equipment	3,719	7,000	
13. Maintenance of breeding stock collections of sugarcane varieties, Summit, C. Z.	3,883	1,117	
14. Acceleration of cotton breeding, genetics, and hybridization at tropical locations	34		
15. Study of standby generators for farm use	3,337	163	
16. Research relating to sugarcane varieties adapted to soil and climatic conditions in Puerto Rico	511	12,500	12,500
17. Research relating to plant nutrients, organic material, moisture, and salinity relationships in soils		2,440	
18. Soil and fertilizer research relating to sugar-beet production	417	1,500	1,500
19. Research to develop disease resistant varieties of tobacco		3,000	3,000
Total miscellaneous contributed funds	71,725	86,000	52,000
Obligations under reimbursements from governmental and other sources:			
Salaries and expenses	239,116	194,300	184,300
Research on strategic and critical agricultural materials	3,798	3,300	2,800
Agricultural Marketing Act	2,493		
Flood prevention		2,000	
Total	245,407	199,600	187,100
Total obligations under allotments and other funds	1,937,972	1,970,444	1,213,100

Mr. ANDERSEN. Dr. Moseman, we are glad to have you and your group with us this morning, and at this time we will be pleased to have a general statement from you.

GENERAL STATEMENT

Dr. MOSEMAN. Thank you, Mr. Chairman.

I think it might be helpful to your committee, particularly to the new members of your committee, to review with you the nature of our research activities, and our cooperative relations with other agencies and groups.

Mr. ANDERSEN. I think that would be fine, Dr. Moseman.

Dr. MOSEMAN. The work of our Bureau can be grouped into five major activities. These include field crops, horticultural crops, soils, agricultural engineering, and the National Arboretum.

FIELD CROPS RESEARCH

Our field crops research is concerned primarily with the major crops, including corn, wheat, and other cereals, forage crops, cotton, tobacco, and sugar plants. We particularly emphasize breeding plants of high yield and good quality and with resistance to diseases, insects, heat, cold, and drought.

In recent years, as you know, we have given increasing attention to research on the control of wheats, with particular emphasis on the use of selective herbicides.

RESEARCH ON HORTICULTURAL CROPS

The research on horticultural crops, including deciduous fruits, citrus, nut crops, ornamental plants, and vegetable crops is similar to the research on field crops.

In addition, we develop improved disease control methods and better cultural practices. We study the biological factors, including diseases, affecting the handling, transportation, and storage of fruits and vegetables.

We have the responsibility in our Bureau for the introduction and testing of promising seeds and plants from foreign countries, not only as potential new domestic crops, but also as a source of breeding material and a source of disease resistance to improve our present crop plants, and we develop methods for avoiding or controlling forest diseases and diseases of forest products.

We also carry on research to reduce the crop damage caused by nematodes and develop methods for the control of crop disease epidemics.

SOIL MANAGEMENT AND CONSERVATION RESEARCH

Our soil management and conservation research includes studies on the use of fertilizers and lime, crop rotations, tillage practices, methods of irrigation, and the control of salinity and soil erosion.

We study the chemical, physical, and biological properties of soils and their relation to plant growth and quality.

We develop new fertilizers and other soil amendments.

In October 1952, the responsibility for research in soil and crop management, and water management on farms, as related to crop production, which was previously conducted by the Soil Conservation Service, was transferred to our Bureau.

This is a point that I believe this committee was particularly interested in in our hearings last year. This, of course, increases our responsibility for research in this field.

AGRICULTURAL ENGINEERING

In agricultural engineering the investigations are concerned with the efficient use of power, labor, machines, and materials on farms. We develop improved farm machines and equipment for growing and harvesting crops, including pest control equipment. We also develop improved methods and equipment for drying hay and grains, for

ginning cotton, and for processing other crops and farm products on the farm or in rural communities.

We are now conducting studies to design better farm storage and service buildings with attention to strength and economy in materials and construction, and improved animal housing with respect to those environmental factors that affect the health and productivity of animals. We also study applications of electric energy in farming, both as power and as radiant energy, that may affect the growth and production of plants or the health of farm animals, with principal attention to the development of additional income-producing uses for electricity on the farm.

NATIONAL ARBORETUM

Finally, the Bureau has the responsibility for the National Arboretum, which, as you know, was established by Congress in 1927. It is under our jurisdiction for development, maintenance, and administration.

RESEARCH RESPONSIBILITY FOR OTHER FEDERAL AGENCIES

I would like to say a word about our research responsibility for other Federal agencies.

We have the responsibility within the Department for conducting research to guide the operating programs of other agencies.

Our research in forest diseases is of vital importance to the Forest Service. Our farm electrification research should meet the needs of the Rural Electrification Administration. I have already mentioned our responsibilities with regard to the Soil Conservation Service.

Also we are conducting research in soil management and irrigation in cooperation with the Bureau of Reclamation, and we are working on weed control in cooperation with the Bureau of Reclamation and the Bureau of Land Management of the Department of the Interior.

COOPERATION WITH INDUSTRY

We have extensive cooperation with industry, following several different patterns. In some cases industry provides the research facilities. This is exemplified by the cooperative work we have with the railroads and the wholesalers in the handling, transportation, and storage studies on perishables.

In other instances we are provided trust funds to help provide financial support for specific lines of research.

Some companies provide materials such as growth-regulating substances, fungicides, or soil conditioners for test purposes. In other cases manufacturers provide specialized equipment to carry on research studies.

In all cases it is recognized and accepted by cooperative industrial organizations that the results of the research they support shall be disseminated for the benefit of the public, and that there shall be no preferential advantage for anyone.

I think that our cooperative relations with industry have been very fine and wholesome in this regard.

30505—53—pt. 2——33

COOPERATION WITH STATE AGRICULTURAL EXPERIMENT STATIONS

In addition to cooperating with industry and with other departmental or governmental organizations we have a close working relationship with the State agricultural experiment stations.

We feel that such cooperation provides for the maximum use of facilities and personnel and also helps to insure the technical soundness of our research results. We all recognize that plant diseases, crop varieties, soil types, and practices for their management are not limited by State lines.

Collectively, our cooperative programs with the States provide for sound regional programs, and through this approach we are able to provide for the systematic replication of experiments under a wide diversity of soils, climate, and agricultural practice.

This is important both in the development of improved crop plants and in our soil management research, which must be modified in order to meet specific local environments.

The close working relationship with the States prevents unnecessary duplication because we give full attention to the coordination of the work in the various States and provision is made for the periodic summarization of the research in progress.

DISSEMINATION OF RESEARCH RESULTS

The manner in which our research results are put into use is somewhat variable. Improved crop varieties are released through cooperating State agricultural experiment stations, which is the case with most of our field crop improvements, but they are also released through established nurserymen and commercial seed trade organizations.

New farm practices are recommended through the Extension Service, the Soil Conservation Service, and others who are in direct contact with the farmers.

Our scientists participate in meetings with farmers, growers, and other groups in order to present information and results firsthand. Federal publications, State bulletins and trade journals or farm magazines are avenues for disseminating research information.

Some of our results are released through industry. These include types of things that industry goes ahead and develops such as fertilizer-production practices, new designs for farm machines and similar improvements that are reflected in better products for the farmers.

FUTURE IMPORTANCE OF RESEARCH

I believe the foregoing provides an indication of the broad and I think important impact of the research of our Bureau on agricultural production.

We have made a number of significant contributions to the overall abundant production of agriculture and also in the development of efficiencies which have made it possible to release farm manpower to industry.

In looking ahead there are at least two major considerations that I think should receive attention in evaluating the role of the research of our Bureau and in determining its effectiveness for the future.

NEED FOR MEETING DEMANDS OF INCREASED POPULATION

First, we are all aware of the need of meeting the demands of the increased population.

By 1975, it is estimated that the 190 million people we will have at that time may require an agricultural production that is about 30 percent or so above that of 1950.

INCREASE IN YIELDS OVER PAST 86 YEARS

The real significance of this magnitude of increase is indicated when we compare the future progress that is required with the record of crop production for the 86 years for which we have records on our major crops.

For the first 44 years of that period there was no significant increase in the average yields of production of our major crops.

During the next 20 years, from 1910 to 1930, there was an increase of only about 5 percent. Since 1930, however, we have increased our yields by about 45 percent.

If we are going to meet the production demands ahead it will mean that we will have to approach pretty closely the increase in crop production that we have had since 1930, or during the past twenty-some years.

Mr. HORAN. Would it not be well to say there that such trend is not necessarily true as to all forms of production? We had a rather extensive increase in fruit production during the earliest period you mentioned.

Dr. MOSEMAN. That is right, Mr. Horan, it varies. These figures here are the averages of quite a number of major crops summarized.

REASONS FOR INCREASED YIELDS

Mr. HORAN. I think it is more significant than that. We had increases where industry itself said that something has to be done if we are going to survive certain economic pressures. I think it is wholesome to recognize that in some cases it was by individuals and associations, and in some cases the emphasis was placed upon geographical needs by State governments. It was very helpful and I think it means something in our consideration of this matter.

Dr. MOSEMAN. I think that is correct, and certainly a large part of the past increase has been due to work done by private groups, to work done by industries and through State experiment stations. It is not all the result of our Federal program, and I am sure that our future production will not have to depend entirely on our Federal research programs.

It is significant, however, I think, to look back at this 20-year period and recognize the number of major improvements that have been made and the significant advances we have enjoyed.

These include hybrid corn, improved chemicals, not only for disease and insect control, but for weed control, increased use of fertilizers, better cropping practices, improved irrigation methods and other cultural practices, including proper combinations of variety, stands, moisture conditions, and fertility levels. All of these things have added up to the rather sizable increase in production that we have enjoyed in the past 20 years.

I think also we should not overlook the impact of increased farm mechanization which provided for reduced manpower on farms and also permitted more timely operations of farm jobs which increased our yields, and reduced crop losses.

NEW ECONOMICS OF AGRICULTURE

The second major factor that I wish to mention is the economic situation facing farmers, which is receiving more attention at the present time.

We all recognize that farming has become a high-cost business. The greater mechanization, increased use of chemicals, including fertilizers, insecticides, fungicides, and herbicides, and other materials needed for production makes the farmer more dependent than ever upon the money income return from his crops.

It has been suggested that with the high money outlay for the production of crops it would require only two or three bad seasons with droughts or serious crop or livestock disease epidemics, for many of the average farmers to be put out of business.

We realize that we cannot protect the farmers entirely against the hazards or problems they face, because they are pretty numerous, but we do recognize, I am sure, the possibilities of reducing crop losses and increasing the efficiency of many farm operations.

Scientific advances are playing an important role in developing greater efficiencies in most segments of American industry, but I do not believe we have realized the full benefits of the research potentials for agriculture. Farming, as you all know, is becoming more and more a precision job that requires specific answers to specific problems.

REDUCTION IN SCIENTIFIC PERSONNEL

Now, I should like to review with you the effect of the reduction in scientific personnel over the past several years. During the current year our total personnel is estimated at 2,037 man-years as compared with 2,720 in 1940. That is a reduction of 25.1 percent.

I would like to point out the significance of this reduction in terms of some of the reduced services, and also in terms of some of the increased losses that have been faced by farmers in recent years.

Mr. ANDERSEN. I think that is quite pertinent at this point.

CROP DISEASE PROBLEMS

Dr. MOSEMAN. I believe the most significant example that we all appreciate is the increased losses from crop diseases in the past several years.

This has been called to our attention in terms of the losses from the wheat diseases, stem rust and bunt, and also black shank disease of tobacco.

Our scientists found race 15B stem rust on wheat back in 1939.

That was discovered, Mr. Chairman, through the cooperative program with the Minnesota Experiment Station on rust surveys with which you are undoubtedly familiar.

Ordinarily, it requires about 10 years from the discovery of a new disease to carry out the breeding work necessary to develop suitable

resistant varieties, assuming that we have a source resistant to this particular disease. During that 10 years following the discovery of race 15B our staff for cereal crop research was reduced by about 39 percent.

The widespread epidemic of race 15B in 1950 caused an estimated loss of about $21 million and in 1952, this past season, there was an additional loss of $17 million sustained by the farmers.

Mr. ANDERSEN. Doctor, I do not think it is fair to draw a direct correlation between the wheat losses incurred and the funds extended by Congress. You explained that there was a very serious loss due to race 15B, but it was not necessarily because Congress did not give you all of the scientists or all of the appropriations that were requested by this particular Bureau.

Dr. MOSEMAN. That is right, Mr. Chairman, and I think we might point out, also, that in this long-time continuing type of research those of us who are responsible for administering the programs as well as those who have the responsibility for evaluating results and providing funds, share the difficult job of deciding when we reach the level that we ought to maintain.

Mr. ANDERSEN. That is correct.

COOPERATION WITH STATES

Mr. HORAN. While you may have some difficulty in the personnel field, apparently your relations with the Minnesota Experiment Station in trying to find the answer to some of the wheat diseases produced results. It is in that field that we are very anxious to have the Federal Government maintain the best possible relationship in order to utilize the facilities existing in those experiment stations. They are quite extensive.

Dr. MOSEMAN. That is right. It is a completely cooperative program and, usually, if we look at the release of crop varieties we have a difficult time realizing which are released through Federal or State efforts. We try to release those as products of the cooperative research programs. It has a beneficial influence on the farmers if the new variety comes to them through their experiment stations. It does not prejudice the variety because of its station origin.

PROBLEM OF RESEARCH LEVEL REQUIRED TO MEET NEW DISEASE PROBLEMS

We certainly do not want to leave the impression that this statement was at all critical of the action taken in providing funds, because we appreciate that it is one of those very difficult determinations as to when we are reaching the right level to maintain in dealing with these continuing disease problems.

Mr. ANDERSEN. I might call attention at this point, Doctor, to the fact that in this particular fiscal year Congress has appropriated for your work in its various phases $11,465,000. That, in itself, is quite a sum of money. Of course, as you have stated, the question is just where to apply these funds to do the most good.

Dr. MOSEMAN. That is right.

Mr. ANDERSEN. That is difficult to determine as you go through the years.

OAT IMPROVEMENT RESEARCH

Dr. MOSEMAN. In some instances in our crop-disease work we are able to keep pace fairly well with the development of new diseases. I think one example is the oat improvement work. As you know the Victoria-Richland hybrids were released about 1939. We released a number of varieties from the cross of Victoria by Richland.

These varieties were very productive and took over about 97 percent of the acreage of the oat-producing States in the plains and in the North Central States.

By 1945, when the Helminthosporium blight disease affected those varieties, causing tremendous losses, we had other hybrids which were available, and farmers shifted over to those without any real loss.

A few years later, we had race 45 of leaf rust which hit these other new varieties, Clinton and Denton, and again we found varieties on short order with resistance to this disease. So, it is a race between disease developments and the ability of our scientists to be ready for them.

Mr. ANDERSEN. At this point, Dr. Moseman, will you insert for the record the balance of your general statement?

(The statement submitted by Dr. Moseman follows:)

FURTHER DISEASE PROBLEMS

A similar situation exists with regard to the bunt problem. The increasing incidence of smutty wheat in the Pacific Northwest is indicated by what happened when the 2 smut-susceptible varieties Elgin and Alicel were released just prior to 1940, for growing in northeastern Oregon where smut was not then a problem. Because of their higher yields and their superior milling and baking quality these two varieties soon spread widely over Oregon and Washington. The increased numbers of cars grading smutty followed closely the increased acreage of the two smut-susceptible varieties. The problem has become even more serious during the past crop season when the variety Rex, previously resistant to the disease, was found to be susceptible in many farmers' fields to a new form of dwarf bunt. Today wheat growers of the Pacific Northwest have no suitable commercial variety of wheat with the necessary resistance to the disease. The losses, estimated at $9,000,000 in 1950 and $6,500,000 in each of the past 2 seasons, can be expected to continue until we can find new sources of resistance and transfer this to acceptable varieties.

The problem of black shank disease of tobacco has followed essentially the same pattern. This disease was present in Florida in 1915, by 1931 appeared in flue-cured tobacco of North Carolina, and since 1940 has spread into the burley areas of Kentucky and Tennessee, and into Maryland and Pennsylvania. In North Carolina 15,000 acres of tobacco were completely destroyed and not harvested in 1951. This was estimated as a $7,500,000 loss, and losses of damaged plants in fields not totally destroyed exceeded those of the acreage actually destroyed. The losses the past season were also estimated at about $15,000,000. Again during the period from 1940 to 1950 the staff available for tobacco production investigations and for breeding disease-resistant tobacco varieties, to combine resistance to black shank with resistance to Granville Wilt, root knot, wildfire, nematodes, mosaic, and blue mold, declined by 26 percent. The House and Senate committees inserted additional funds in our 1953 appropriation and we are working closely with the State agricultural experiment stations in developing a stronger research program that should meet the problem.

I am mentioning these disease problems primarily to call attention to what has happened and what we can expect to continue to happen unless we take steps promptly to place our research program on a more adequate basis to help meet these problems before they hit farmers' fields in epidemic proportions. Such losses from crop diseases cannot be avoided entirely, but the degree and extent of loss can be reduced by a stronger and more timely research program.

Farmers today are faced with the hazards of several new diseases of major crops. A few years ago we recognized the seriousness of the Tristeza disease of citrus. Funds were provided by Congress to send a Bureau scientist to South

American countries to study the nature of the disease, its spread, identification, resistant root stocks, and other factors. This was done to provide the necessary background information to meet the problem more promptly if and when the disease reached our shores. It is now here, in California, in Louisiana, and in Florida. Our work in South America is of inestimable value in giving us a running start in meeting the problem, but a greatly expanded research program is necessary to adapt the information and develop the varieties suited for the several important domestic citrus areas. Again we are not in a good position to carry forward the research program we know is necessary to reduce the many millions of dollars of annual loss from citrus decline diseases because our staff on the citrus breeding and improvement program has been reduced by 20 percent since 1940.

A second similarly serious disease is Virus Yellows of sugar beets, one of the most severe diseases of this crop in Europe. A Bureau pathologist spent several weeks in European countries in 1951 getting information on identification of the disease, its dissemination, and possible measures for combatting it. Last season we found the disease in sugar-beet-producing areas of California, Oregon, Utah, and Colorado. Fortunately, there is evidence that we may have sources of resistance that can be incorporated into commercial varieties through an expanded breeding program. Our handicap in doing this job rapidly and effectively is indicated when we consider that the research staff on sugar-beet breeding and pathology is reduced 21 percent below 1940 and 35 percent below 1933.

A third disease in very much the same category is a downy mildew of sugarcane which has been identified very recently in Louisiana. This is the first positive identification of the disease other than in Australia where it has caused serious losses for about 10 years, and in Peru where it was recently found. The new variety C. P. 44–101, which has a high degree of frost tolerance and resistance to inversion and which is increasing rapidly in acreage in Louisiana, appears to be susceptible to this disease which is caused by an unidentified species of the fungus genus Sclerospora. Although the extent of infection in Louisiana is still very limited and there is no reason for undue alarm regarding the disease at this time, the damage to infected plants is extremely severe, and we know it is another disease problem to be reckoned with only through development of resistant varieties. Our personnel on sugarcane research has been reduced by 42 percent since 1940.

NEW POTENTIAL BENEFITS NOT ATTAINED PROMPTLY

We are concerned also about the inability of our current research to develop rapidly the potential benefits that are near at hand in several of our research programs. You are undoubtedly familiar with the experience last spring of cotton growers who used chemicals for preemergence weed control in cotton. The unusual weather conditions combined with action of the weed-control chemicals, resulted in exceptionally heavy losses of stands and it is estimated that about half of the 300,000 acres treated with chemicals had to be replanted because of the herbicide injury. Many growers who had to replant last spring indicated that they would again use chemicals for weed control because it was their only possibility of producing a crop. Labor for hand-hoeing just was not available and it was a choice of risking injury from chemical weed control or assuming almost certain heavy losses from weed infestations. We are not in position to make the kinds of recommendations cotton growers must have.

In this connection, I should like to mention studies under way at Beltsville that demonstrate how the activity and specificity of herbicides for certain plants depends on the molecular configuration of the carbamate derivatives. (Chart.) A substitution of chlorine or other element or group at one or more locations on the benzene ring substantially changes the selectivity and specificity of the compound. Chlorine added at the No. 3 position kills germinating crabgrass; when a methyl group is added at the No. 6 position the compound also kills mustard and pigweed, two broad-leaved species, but cotton is unharmed. These studies demonstrate convincingly the need for detailed and fundamental tests that will give us the background for successful formulation of foolproof selective herbicides. If we had had the personnel and facilities to make such tests 3 to 5 years earlier, we would have been on much better ground to make recommendations to cotton farmers. Even today we do not have the chemists or the facilities to synthesize these pure derivatives and it is only through the wholehearted cooperation of industry in supplying these materials that the tests can be conducted.

Adjustments in the use of fertilizers and soil management practices present similar problems. As you know, steps have been taken to increase production and use of fertilizers over 1950 levels, calling for 70-percent increase in nitrogen, 55 percent in phosphates, and 51 percent in potash by 1955. Federal and State agencies, as well as private industry groups, are developing educational programs to insure the widespread utilization of these materials. Here again we do not have the sound background information that should be available to guide this educational and extension program. We know that difficulties will arise with regard to nutrient balance and minor element deficiencies when heavy applications of nitrogen, phosphate, and potash are made in certain areas. Until we have more specific information about these relationships we must recognize the gamble and the risk in heavier fertilizer use in such areas, with the farmer paying the bill.

The recent development of chemical soil conditioners presents the combination of potential benefit and excessive public exploitation that is not too far different from the situation when herbicides first flooded the market in 1946. Bureau scientists participated in the initial field evaluation of certain of these soil-conditioning materials and the possible long-range agricultural benefits are intriguing. This potential can be realized, however, only by intensive studies of the mechanism and reaction of these compounds in various soils and by comprehensive studies of the effects on crops of the changes in soil moisture and soil air supply produced by soil conditioners. The public is being offered an increasing supply of these materials, some of which are good, others less effective, and still others almost worthless. We have been unable to meet the needs for information on these materials, much less carry forward the research of a positive nature to reap the real benefits these materials should provide.

BASIC AND BACKGROUND RESEARCH

The third condition I should like to discuss is our current inability to build up background or fundamental knowledge that is so necessary for further practical applications. We are not giving adequate attention to the study of basic principles to understand more definitely why plant and soil reactions occur as they do. It is estimated that only 15 percent of our current funds are devoted to such background or basic studies. This is the part of our research that will provide the basis for the answers to farmers' problems in the years ahead. Our present program is not developing these answers at a satisfactory rate and our proposed 1954 program will still be inadequate in this regard. I will mention just a few of the many areas of research where current developments suggest the desirability of further study. We all know of the great development in the use of antibiotics for controlling human and animal diseases. Can we use antibiotics for plant-disease control? Preliminary experiments at our plant industry station have shown that some of the antibiotics developed for animal diseases, such as streptomycin, can be absorbed by plants, are translocated, and protect the plant against some bacterial diseases. It was demonstrated in 1951 and again this past season that streptomycin applied to bean plants would protect them against the bacterial diseases halo blight and common blight. These preliminary results indicate the desirability for greatly expanded research in the use of antibiotics for plant-disease control. Materials so far available, selected on the animal basis, are probably not those most useful for plant protection. Extended research in this field might well lead to a completely new approach to the problem of controlling certain serious bacterial and virus diseases of plants for which no cure is now known.

We have known for several years that certain minor or trace elements play an important role in the nutrition of plants and animals. We also know that soils differ widely in their ability to supply these elements and that such differences are reflected in the composition and nutritive value of crops. In a cooperative study of nutritional problems of cattle in St. Lawrence and Franklin Counties, N. Y., an analysis of 342 samples of mature timothy showed that only 3 samples contained more than the minimum amount of cobalt required for maintenance in cattle. About one-third contained the minimum quantity and the balance contained less than the minimum considered necessary. Only 28 of the 342 samples contained as much copper as is ordinarily considered essential. Soil samples were collected with the timothy samples and "availbale" cobalt and copper were measured by five different methods. Neither total nor available quantities of cobalt or copper in the soil were found to be correlated with the amount in the plants. Obviously, further basic research is needed to develop chemical methods for determining the quantities of minor elements in soils that are available to crops. If such methods

were available, they could be used in State soil testing laboratories and would greatly expedite investigations on the adequacy of minor elements in soils for the production of crops of high nutritive value. Our inability to move ahead rapidly in this field is indicated by the 42 percent reduction in staff for the Plant, Soil, and Nutrition Laboratory since 1944.

ADJUSTMENTS IN PROGRAM

In considering these areas of work we realize one question that may be asked is "Why don't we shift funds from other jobs to the ones I have mentioned?" We have made many shifts of this kind. In recent years we have shifted funds to the programs on wheat diseases and tobacco diseases. During the current year we have further adjusted our program to provide some additional funds for sugar plant research and for research on nematodes. Our ability to make such shifts is limited because other problem areas have almost equal urgency. While I have mentioned a few crop diseases, we recognize many other potentially or currently destructive diseases facing farmers that require continuing attention. These include stem canker of soybeans, a new virus disease of lupines, root rots of red clover, and crown rot of crimson clover, as well as the new race 101 of crown rust of oats which made up about 20 percent of the crown rust collections in the United States in 1951. The need for attention to these disease problems is relative but they are all important and those I have mentioned particularly are ones that might well promise to reach the same damaging proportions that our farmers have experienced from race 15B of stem rust of wheat and black shank of tobacco. A second factor limiting our ability to shift personnel, as has been pointed out earlier, is the decreased scientific staff. We cannot meet new problems at the higher tempo demanded by farmers in fields where our research staff has been reduced by 20 to 40 percent in the past 10 years.

ALTERNATIVE COSTS

We appreciate the need for holding down Federal expenditures, but I believe we do face the very real question of which road to take for maximum economy. The $21,000,000 loss to race 15B of stem rust in 1950 alone would carry all wheat-breeding research by Federal and State agencies for developing disease resistant wheat varieties for more than 40 years at our present rate of expenditure. The $15,000,000 loss estimated to North Carolina tobacco growers in 1951 would have provided for an even longer period of support for tobacco-disease research. The unfortunate fact is that farmers are still not through realizing losses from these 2 diseases where our research programs only recently have been strengthened. Wheatgrowers and tobacco growers for the next 5 to 7 years are still very much at the mercy of the seasonal conditions that may or may not be suitable for the development of widespread epidemics. It would seem desirable to strengthen our research programs to the point where we can do a more effective job of heading off such losses and stop them before they have to be measured in terms of millions of dollars of economic loss to farmers and in terms of reduced supplies at higher prices to consumers.

1954 BUDGET ESTIMATES

Our 1954 budget requests provide for strengthening several lines of work where problems are most critical. In Field Crops research we are asking for funds to strengthen our sugar-plant research for the reasons already indicated. We are also requesting funds to advance the development of improved practices for chemical defoliation of cotton and to develop better methods of weed control in cotton. These are the two principal handicaps in mechanization. Another problem is the improvement of pastures and forage crops in the South, to aid in conservation of the soil and water resources, speed up diversification of agriculture in the area, and reduce losses many farmers are suffering in attempting to convert to livestock production. We are requesting an increase for research on citrus diseases and for strengthening forest-disease work in the Great Lakes and Northwest regions. Our soils research should provide for more attention to the nutritional quality of crops in relation to the soils on which they are grown. We have been subject to considerable criticism from the Research Advisory Committee on seed research for failure to give adequate attention to the improvement of harvesters for grass and legume seeds where present equipment is inadequate and losses of 30 to 50 percent of the seed crop are common. We expect to concentrate more attention on this problem in 1954.

Our estimates also provide for an increase for operating the National Arboretum. Last year, 1952, marked the 25th anniversary of the act of Congress establishing the National Arboretum. It is still not open to the public. I believe it is reasonable to step up the development and operational program to bring to a more rapid realization the scientific and educational benefits from the National Arboretum, as envisioned by the Congress in 1927.

Mr. ANDERSEN. As you have stated, Doctor, you have five general classifications under your Bureau. First, you have field-crop investigations; secondly, horticultural-crop investigations; third, forest-disease investigations; fourth, soil, fertilizer, irrigation, and agriculture investigations; and, finally, agricultural-engineering investigations.

FIELD-CROP INVESTIGATIONS

SUFFICIENCY OF EMPHASIS ON PROGRAM IN RELATION TO ITS IMPORTANCE

To me the work on field crops affects such a vast segment of our agricultural production in value that I believe it is the most important part of your work.

Here we have $6 billion or more in gross income from our major farm crops, referring to cotton, wheat, corn, oats, barley, rye, flax, and soybeans.

In corn, production alone has increased as a result of research from $500 million to an annual crop valued at $1 billion. This was achieved through the development of hybrids, and consequently we can realize the great value of research of this nature.

I sometimes question whether you gentlemen put a sufficient portion of your allocated funds into field-crop investigations. I do not want to detract from the horticultural-crop investigations in any way, but there is no comparison, in my opinion, so far as the value of the crops affected is concerned. Yet we find that in 1952 your Bureau spent $3,571,000 in field-crop research while in the specialized field of horticultural-crop investigations you spent approximately the same amount, $3,484,000.

Do you have any comments on that, Doctor, as to the placing of proper emphasis in your work?

Dr. MOSEMAN. I believe we can say, in answer to that, Mr. Chairman, that we are trying to provide for the investment in research that we feel is necessary to take care of the major problems in these different fields, not only considering our own contribution to the research program but also considering the work that is being done by the State experiment stations and by industrial groups and by others.

I think the hybrid-corn program is a pretty good example of the way we try to manage our research programs.

As you know, most of the breeding of new hybrids is being done by industry now. They have taken over that particular job, and it is less necessary for us to lead the way and carry this burden than it was 25 years ago.

The same situation applies, in a little different way, in some of the other cropbreeding work. We try to develop the kind of level of support required. In wheatbreeding, for example, we take into

account what the States are doing and we combine our support in order to develop an adequate program to take care of most of the significant problems.

RATIO OF RESEARCH FUNDS TO VALUE OF CEREAL-CROP PRODUCTION

Mr. ANDERSEN. Doctor, I mentioned that the particular crops I made reference to earlier have an annual value of $6 billion. I want to change that to $7,500,000,000. This covers corn, wheat, oats, barley, rye, flaxseed, rice, grain sorghum, and popcorn; and, as I understand from my figures here, it does not include cotton or tobacco.

You have one research agency, the Division of Cereal Crop Diseases, where you expend approximately $1 million a year, do you not?

Dr. MOSEMAN. Yes, sir.

Mr. ANDERSEN. In other words, you expend, according to my estimates, less than one seventy-fifth of 1 percent of the value of the total annual production of those crops in research, trying to improve production and prevent diseases.

To restate the question, are you using the proper proportion of your employees upon this broad field, which certainly is far more important to the people of America in potential productive power than are any of these others?

Dr. MOSEMAN. I believe, Mr. Chairman, that we should point out that the horticultural crop work includes, in addition to work on fruit and vegetable crops, and the type of thing that we are doing in field crops work, several other activities. One is the handling, transportation and storage of perishables which is really in the marketing field, to a certain extent. We allocate about $450,000 to that program.

Mr. ANDERSEN. Yes, we understand.

Dr. MOSEMAN. Secondly, we have in that group a unit for plant exploration, and about $431,000 of our funds go to that plant-exploration program.

A third unit is for research on nematodes, that is, the control of nematodes which you realize attack not only the horticultural crops, but also field crops and sugar beets.

Mr. ANDERSEN. How many millions of dollars have we expended through the years on nematodes?

Dr. MOSEMAN. That has been a rather small program actually, Mr. Chairman. We are allocating about $135,000 to it in 1953, which is slightly more than in 1952. The Bureau of Entomology and Plant Quarantine has about $345,000 for control of golden nematode of potato and you may have that in mind.

Mr. ANDERSEN. I am not questioning the value of that project, but I am trying to place these things in their proper field of importance. As concerns the large crop of oats that we have, for example, which constitutes one of the major cereal crops in America, yet only $58,220 was expended by your Bureau in research during this fiscal year. Yet the value of that crop approaches $1 billion a year.

Now, do you not feel that we should become a little more liberal with such an immense crop, the potential value of which amounts to

a billion dollars and, perhaps, cut down a little on some things that are not of such importance to the producer?

For example, take the flax program. I believe you spent $48,850 for research this fiscal year, yet the value of the flax produced in America must be in the neighborhood of $200 million annually on an estimated 45 million bushels at $4.50 a bushel.

My line of questioning, Doctor, as I have stated before is this: Are we paying sufficient attention proportionately to our large crops? To further illustrate the point, I believe you allocated only $120,000 for stem rust in the fiscal year 1953, yet we are dealing with a crop worth at least $1,500 million, and we can potentailly lose by stem rust $200 or $300 million in 1 year—probably the total amount your Bureau has received in appropriations from Congress over a 20- or 25-year period.

It may be that we, in the Congress, have not been liberal enough with you in regard to these great cereal crops. I would like your comment on that point. Perhaps we are at fault.

BALANCING RESEARCH FUNDS WITH RESEARCH PROBLEMS

Dr. MOSEMAN. Mr. Chairman, as I mentioned earlier, I believe that this is one field of continuing research, where it is a little hard to determine just what level to mair tain. If we move along at about the right level of research we can pretty well keep ahead of the so-called emergency problems as I tried to point out to you awhile ago. If we fall down below a reasonable level then we run into such problems as 15B rust on wheat, and black shank disease on tobacco.

At the same time, I can assure your committee that we also are very reluctant to place more of our funds on those particular programs than we can justify in terms of trying to maintain a reduced, and, we hope, a somewhat balanced budget.

Mr. ANDERSEN. Doctor, I am not being critical; I am just calling this to your attention for further review.

Let us go into another problem. You mentioned race 15B, stem rust. Just what is the present status of your research on that?

Dr. MOSEMAN. At the present time, we have three varieties of rust-resistant wheat that have been developed in our cooperative experiments with the North Central States, especially with the Minnesota station, that are being increased this winter for extensive field trials next crop season.

COOPERATION WITH STATES

Mr. HORAN. We would like a discussion of the efforts of your bureau in coordinating and integrating general research and cooperating with all the known talent in the Nation.

In the case of the land-grant colleges, they are more intimately acquainted with the problems in their area and consequently are liberally supported by the people whom they benefit, yet it is possible for the Federal Government through coordination to do a tremendous job in helping the local people do a commendable volume of work.

I would like inserted in the record an analysis of the coordinated research being conducted in the land-grant colleges and the amount made available by the States together with an accounting of the funds made available by Federal appropriations. If we could have that it would give us a better picture of the situation.

Dr. MOSEMAN. Yes, sir, I believe that can be supplied.

Dr. CLARKSON. We have a breakdown of the totals, but we do not have it available by States.

Mr. HORAN. Would you insert a breakdown of the totals in the record.

(The material referred to is as follows:)

COOPERATION WITH STATE AGRICULTURAL EXPERIMENT STATIONS

The cooperation between the BPISAE and State agricultural experiment stations on research problems of mutual interest is covered by a series of memoranda of understanding. These documents describe the arrangements for carrying out the objectives of the study and define the mutual and individual responsibilities of the cooperators in terms of financial responsibility (estimated), duties of each party, and the dissemination of results. Neither party, however, is prevented from undertaking independent investigations on related subjects over and above those covered by the understanding. Each agency is responsible for the expenditure of its own funds with the State providing appropriated funds for the purpose or by an allocation of Federal-grant funds made available by the Office of Experiment Stations, USDA. In many cases joint employees are hired to conduct the investigations if mutually agreeable. Since Federal research funds available to BPISAE do not permit active Bureau participation in all States or regions concerned within the problems. One or more State agricultural experiment stations may undertake independent investigations on such problems along the same general line as the Bureau may be conducting elsewhere. These activities are coordinated by contacts between the scientists concerned.

The States are accountable to the Department only for their expenditures from Federal-grant funds which must be spent on specific projects approved by the Office of Experiment Stations. Therefore, the details on individual expenditures from State appropriated funds by research categories are not required by the Department. However, the summation of all State experiment station expenditures for the principal research categories in which BPISAE is engaged are shown in the following table.

Estimated State and Federal obligations [1] (1952) for the principal research categories in which BPISAE is engaged

Research category	Total State agricultural experiment stations	U. S. Department of Agriculture	
		Total Department [2]	BPISAE
	Million dollars	*Million dollars*	*Million dollars*
Field crops (including forages and pastures)	15.41	5.19	3.85
Horticultural crops	11.47	4.74	[3] 3.53
Soils	6.77	3.27	2.54
Engineering and structures	2.57	1.06	.84

[1] Department obligations from regular appropriations, exclusive of working funds, miscellaneous contributed funds and reimbursements. State obligations include Federal-grant funds which comprise approximately 17 percent of the State totals.

[2] Other departmental agencies besides BPISAE conduct closely related investigations in each of the categories shown; for example, insect-control investigations of field and horticultural crops (BEPQ), engineering studies on irrigation and drainage, and research on sedimentation, hydrology, and related problems of concern to Soil Conservation Service operations (SCS), and housing studies (BHNHE). Certain BPISAE activities are classified under the marketing category not shown in the table because this category is not the primary responsibility of this Bureau.

[3] Includes $0.49 million for forest pathology investigations.

INCREASED SUPPORT OF RESEARCH BY STATES

Mr. ANDERSEN. I want to call attention to the fact, that the States are investing increasing amounts in agricultural research at their various experimental stations.

Take Minnesota, for example: the budget which is before the legislature today indicates an increase of more than 70 percent for general agricultural research, which includes work on stem rust, soils, dairy manufacturing, crop breeding, mastitis, fruits and vegetables, brucellosis, and the corn borer. It shows the interest exhibited by the various States in that line of work.

Mr. HORAN. At this point I would like to have inserted in the record all of the funds the expenditure of which you have the responsibility, either through direct appropriations, transfers, or allotments.

Mr. BEACH. That is given in the back part of the justifications that we have here.

Mr. HORAN. This is what the Bureau itself expends directly on the items that are itemized here in the hearings, and I trust these will be in the hearings.

Mr. ANDERSEN. Yes, we have inserted this table.

USE OF FEDERAL GRANT FUNDS FOR COOPERATIVE RESEARCH

Mr. HORAN. Through various acts we make grants to States; and some of those funds, of course, are in this research program?

Dr. MOSEMAN. Yes, Federal funds are granted to States for work in the same fields for which the Bureau has Federal responsibility.

Mr. HORAN. Do you have any way of giving us some idea of what is done with the funds under the grants to States, as they affect the work that you are doing cooperatively in this field?

Dr. MOSEMAN. I believe we could get those figures from the Office of Experiment Stations. They handle the allocation of grants to State experiment stations.

Mr. ANDERSEN. Mr. Whitten, do you have some general questions on this item?

REORGANIZATION OF SOIL CONSERVATION RESEARCH

Mr. WHITTEN. Doctor, what is the present status of the so-called reorganization and its effect on soil conservation research carried on by the Soil Conservation Service and your own Bureau? I would like to know what changes were made and how it is working out; the changes in the way of subject-matter and also as to the geographic locations of your work.

Dr. MOSEMAN. The responsibility for research on crop and soil management, and on water management research, as it applies on farms and farm production was transferred from the Soil Conservation Service to the Bureau last October.

Mr. WHITTEN. Is the difference in whom people report to.

Dr. MOSEMAN. That was the effect of the immediate transfer.

Now we recognize, as I am sure the committee has recognized in the past, that the work we were doing in soil management research on production problems and that which the Soil Conservation Service was doing for conservation requires further integration, so we have only 1 program instead of 2 separate programs.

Mr. WHITTEN. Doctor, a few years ago we were concerned in this committee about what looked like duplication. Taking the budget justifications and reading the titles of the work you were doing, and the work that the Soil Conservation Service was doing, it frequently looked like the same thing.

On investigation we generally found that there was a very clear distinction. Beyond that, when we got into the question of the location of the studies we found that your Bureau had been established in those areas that had certain problems, and that soil conservation units had been put into other areas due to geographic problems.

Dr. MOSEMAN. That is correct.

Mr. WHITTEN. What changes have been made in that, if any?

INTEGRATION OF SOILS RESEARCH PROGRAMS

Dr. MOSEMAN. I might point out that we are now making a thorough study of the research activities we had, and that the Soil Conservation Service had, in cooperation with the State experiment stations. We are making a State-by-State field review of this research in order to develop a program within the States, and also on a regional basis, that will be most effective in getting the job done on the most significant problems that exist in those areas.

REGIONAL RESEARCH COOPERATIVE WITH STATES

Mr. LAIRD. When you make these tests with the experiment stations, do you run the same tests in various sections of the country? Just how diversified are your tests?

Dr. MOSEMAN. That varies somewhat, Mr. Laird, depending upon the type of experiment.

In our crop work we try to carry uniform varieties; that is, the same varieties are included in the tests at a large number of locations.

When we come to soils research, it is not so simple to duplicate experimentation over a wide area, because there are differences in soil and climatic conditions, which limit the extent to which you can duplicate exactly the experiment in a number of locations. But, in general, that is one of the features of our Federal participation in these programs; that is, we provide for this uniform testing on problems that are significant to a large number of locations and a large number of stations, that cross State lines.

RUBBER PRODUCTION, BREEDING AND DISEASE INVESTIGATIONS

Mr. HUNTER. I notice an item here on rubber production. What investigations are you conducting in connection with rubber? I notice that the amount is relatively small; it is only $34,000.

Dr. MOSEMAN. Under this item, Mr. Hunter, we have a program designed to study the different types of plants that may produce rubber. Included in that is the study of such plants as the so-called Russian dandelion, cryptostegia, and other plant varieties. We study those plants that may contain some rubber, primarily to develop background information about their possibilities, because we are never sure just when we may be called upon to come forward with a recommendation as to what plants we can grow in this country that might serve as a domestic source of natural rubber. This is not a

very extensive program and it is more or less in the terms of a survey, studying plants and the environment and the conditions where they might be suited.

RUBBER RESEARCH UNDER ALLOTMENT FROM RESEARCH ON STRATEGIC AND CRITICAL AGRICULTURAL MATERIALS APPROPRIATION

Mr. HUNTER. How does this item tie in with the item which is on page 272, entitled "Research on Domestic Production of Natural Rubber," which carries an estimate of $108,000?

Is that different from this other? Does that involve a different activity than the one which I previously mentioned which is entitled "Rubber Production, Breeding, and Disease Investigations"?

Dr. MOSEMAN. The larger item to which you are referring is supported by the Munitions Board as a part of our strategic and critical materials program.

That is really an effort, Mr. Hunter, to step up the work on rubber production studies on a given crop to tie in with our current emergency.

Now, the program that we have under regular funds is designed primarily to find out whether there are other plants that might be used as a domestic source, in addition to guayule. I think there is some question about guayule as a rubber crop.

Mr. ANDERSEN. Goldenrod is an example.

Dr. MOSEMAN. Goldenrod, and I might mention cryptostegia and koksagyz.

You may recall, Mr. Chairman, the work that was done around Cass Lake, Minn., on the Russian dandelions during the early part of World War II. We are trying to determine whether there are strains of those particular crops that might be higher in rubber yield than the general run of them.

RESEARCH ON CONTROL OF WHEAT RUSTS

Mr. MARSHALL. Over the years in dealing with rust on wheat, you have combated rust damage by creating a wheat that is resistant to rust. There has been some work in addition to that in attempting to control the rust itself.

I think it is generally appreciated how successful you have been in developing varieties which are rust-resistant. However, my questions are directed to the other phase of the rust-prevention control.

Would you care to comment on that?

Dr. MOSEMAN. I could give you an answer on that, Mr. Marshall, if you would like. One of the major controls that has been given some attention is the control of the barberry plant which is the alternate host of the rust organism. That work is under the Bureau of Entomology and Plant Quarantine. There are other means that have been tried for control. One is the development of an earlier maturing variety in order to escape the disease. In recent years there has been some attention given to chemicals for spraying and control of the disease in that way, but we have not participated materially in the latter type of study. Some of the State experiment stations have been carrying on that kind of work. We have concentrated primarily on the breeding of disease-resistant varieties, because we feel this would be the most economical way for the farmer to control the hazard.

BREEDING FOR RESISTANCE TO RACE 15–B

Mr. ANDERSEN. Doctor, do you not feel we have been a little remiss in not doing more along the breeding line in developing new strains to meet the problem, such as race 15–B. Do you not think so, Mr. Marshall?

Mr. MARSHALL. The 15–B is a new strain that has developed. That has a number of characteristics that are not related to the old strain of rust that some of the varieties of wheat are susceptible to. Am I right?

Dr. MOSEMAN. That is correct. These new races are different strains. They have varying degrees of virulence. Race 15–B may attack most of our commercial varieties in this country, but we have wheats that were located in Africa, of the Kenya type, and other strains from Brazil that are resistant to disease. In our breeding program the thing that causes considerable trouble is that if we use these foreign varieties—the Kenya type and Brazilian type—they may in turn be susceptible to race No. 56, which was one of the most severe races in the Plains States or to some other race of rust. So, we have to increase not only resistance to the new race, but also hold resistance to all the old races.

DANGER FROM POTENTIAL INTRODUCTION OF DESTRUCTIVE FOREIGN DISEASES

Mr. ANDERSEN. Doctor, we spend a lot of money on these things after they get into the United States, but do you also do any research on new rusts or diseases that might be prevalent today in South America or Mexico that might present a future threat? I have reference to some of those diseases that perhaps are down there now waiting to come into the United States. What is your Bureau doing toward studying those in their natural habitat today?

Dr. MOSEMAN. That varies considerably with the different crops, Mr. Chairman, but I think I might mention the rust program. We are cooperating with a number of the Latin American countries.

Mr. ANDERSEN. Further in this regard, is there some new rust developing down there that has not as yet come to the attention of this subcommittee that might be dangerous, such as 15–B?

Dr. MOSEMAN. There are several and there is one that is particularly damaging, because it will hit anything we have in this country.

Mr. ANDERSEN. Why do you not have a scientist down there looking into the problem and, perhaps, with the cooperation of Mexico and those other nations, try in that area to develop some means of eliminating it before it comes up across the line? Why should we not spend a little bit along the line of preventive medicine here?

Dr. MOSEMAN. We are doing just that in the case of this rust.

Mr. ANDERSEN. Where in this budget are you spending money on that?

Dr. MOSEMAN. That program is supported by a supplemental working fund from the Defense Department.

We are providing wheat strains that we have in our world collection, which includes about 13,000 varieties. They are being grown in several foreign countries and evaluated for their resistance to the races that exist there.

Mr. ANDERSEN. We spent $130 million stamping out foot-and-mouth disease in Mexico so that it would not come into the United States. Why would it not be good business for your Bureau to determine if there are some of these pests below the border which would, with proper encouragement by weather or some other cause, come up and create a disturbance in this Nation. Do you not think that is a good line at attack?

Dr. MOSEMAN. Yes, sir; and we have done that in relation to the virus yellows disease of sugar beets, where we sent a man to Europe a year ago this past summer to study the disease and to become familiar with its symptoms.

I believe you will recall that this committee provided funds for study of the tristeza disease of citrus in the Argentine and Brazil, to give us background information on that disease.

Mr. HORAN. I notice in some of your allotments you have research related to the formation of rubber in Hevea trees, in the amount of $20,000 and I assume that the rest of that item from the Department of Defense relates to what you have been discussing, which totals some $90,600.

Dr. MOSEMAN. That is the item under which we are doing this research on rusts in foreign countries.

RUBBER DEVELOPMENT PROGRAM IN WESTERN HEMISPHERE

Mr. HORAN. Right below that is an interesting item. An advance of funds from the Institute of Inter-American Affairs to cover expenses in connection with the program under title 4 of the Mutual Security Act. Those are for investigations directed toward the development of rubber production in the Western Hemisphere, and for that you have an allotment of $324,085. Of course, we all know that in about 1870, the rubber industry was almost transferred bodily by the Dutch from South America to the Dutch East Indies. And, of course, it was to their benefit to reestablish that industry where the trees would grow.

SUMMARY OF RUBBER DEVELOPMENT PROGRAM IN LATIN AMERICA

Would you discuss the progress of this rubber-production program, and also the kind of cooperation we are getting from those who are benefiting by this.

Dr. MOSEMAN. This particular item, Mr. Horan, is plantation rubber development that was initiated back about 1940, with a survey that was made by a group of United States scientists in the Amazon Valley and other areas in South American countries where it was thought it might be possible to develop rubber production on a plantation scale. You recall that Ford and Firestone and other private interests had been trying to do that, but were faced with the South American leaf blight disease of the hevea rubber tree. Following the survey in 1940, funds were provided through the Cooperation with American Republics appropriation to the Department of State, for research on disease resistance—to develop leaf-blight-resistant strains that could be used in this plantation program. We have developed quite a number of good disease-resistant, high-yielding

types, primarily through a process of budding and grafting. We are taking root systems that are good and strong and grafting onto them a high-yielding trunk and on top of that a leaf-blight-resistant foliage.

These types of plants are produced in cooperation with the South American countries and then released essentially to the individual farmers in the country to establish single family production programs. Our work is concerned with the technical program to develop additional resistant types, better cultural and management practices, and information of that kind. It appears under the Mutual Security program now, because the earlier legislation was lumped into the Point 4 legislation at the time that act was passed a couple of years ago.

COUNTRIES IN WHICH RUBBER PROGRAM OPERATES

Mr. HUNTER. I would like to pursue that further.

Where is this $324,000 being spent? Is it being spent in Brazil, or partly in Brazil and partly here? Is it confined almost entirely to the subject which you mentioned; namely, the development of a disease-resistant rubber tree?

Dr. MOSEMAN. It is spent on the breeding and development of resistant strains of rubber trees and also on the study of cultural practices, because we do not know enough about the cultivation methods down there to know just how the soil must be prepared, what fertilizer to use, plant spacing and all of those factors. It is for research of that kind, Mr. Hunter. The major part of it is spent in the foreign countries.

We have worked cooperatively with Brazil and with Haiti at one or two locations. We have men stationed in Costa Rica, who are in charge of the regional phases of the program. We are trying to develop this in the same way that the programs in the States are developed, and we encourage the various countries in South America to cooperate in the exchange of material and information. The man who is in charge of our plant-disease program is located in Costa Rica and also the agronomist who has charge of the cultural and management study is located there.

Mr. HUNTER. I agree with Mr. Horan that it would be a good idea if we could develop a supply of natural rubber in the Western Hemisphere, but our experiments in Brazil during the war were not successful. I do not know how much rubber was finally obtained, but it must have cost at least $20 a pound.

The reason I am particularly interested in this is because I spent about 6 months in the Amazon region. The Ford and Firestone people gave up trying to produce rubber there commercially, and it was not only this question of developing a plant. They apparently had developed a disease-resistant and productive plant by using the natural roots and foliage and an East Indian trunk, but they had the problem of conquering the jungle. It kept moving in on them. They could not get anyone to go out there and work in the jungle. Ford finally sold out for practically nothing to the Brazilian Government, and I do not think the Brazilian Government is doing very much at the present time. Personally, I believe we are going to have to depend more on synthetic rubber rather than natural rubber from Brazil.

SUPPORT OF RUBBER-DEVELOPMENT PROGRAM BY LATIN AMERICAN COUNTRIES

Mr. HORAN. Could you put in the record the amount that other countries are spending in cooperating with us in this field?

Dr. MOSEMAN. We will try to get the information and insert it in the record.

(The information referred to follows:)

Estimated costs of rubber research and development in Latin America, fiscal year 1953

Country	Estimated expenditures for research, development, and production			
	United States—BPISAE [1]	Latin American countries		
		Governments	Companies and individuals	Total
Bolivia	$5,554	$71,500	$15,000	$86,500
Brazil	54,535	960,000	20,000	980,000
Colombia	19,658	70,000		70,000
Costa Rica	67,025	4,000	175,000	179,000
Dominican Republic	4,887	50,000		50,000
Guatemala	14,633	15,000	45,000	60,000
Haiti	18,950	60,000		60,000
Mexico	27,743	37,000		37,000
Peru	9,829	102,000		102,000
Regional	101,271			
Total	324,085	1,369,500	255,000	1,624,500

[1] In addition to the funds assigned to the Bureau of Plant Industry, Soils, and Agricultural Engineering for obligation on the rubber program, the Institute of Inter-American Affairs has allotted an additional sum of $225,000 for expenditure by directors of technical cooperation in the individual countries.

Mr. HUNTER. It is more the human element which is important—more important than the scientific element in developing a productive plant. I do not mean to minimize in any way your efforts. I think they have been very good. As a matter of fact, you have made more success than many of the other groups that are involved.

Dr. MOSEMAN. Well, you certainly touched on a good point there, Mr. Hunter, and that is the reason that we have stressed this family farm type of production, because we found with the plantation development the labor situation was particularly critical. The governments in those countries are now providing additional support and Brazil especially, has come to the fore just in the last year or two and has stepped up their contribution rather materially.

FORAGE CROP PRODUCTION, BREEDING, DISEASE AND QUALITY INVESTIGATIONS

Mr. MARSHALL. In Minnesota we had a man whom we considered to be one of the really outstanding men in farm management in the United States. I am referring to the late Dr. Andrew Boss. Dr. Boss in his lifetime of experience felt, as he expressed it, that there were two phases of farm management; the high-pressure type of farming and the low-pressure type of farming. The high-pressure type of farming has been forced ahead because of the period that we have been through and the demand for cultivated crops. The other phase, the low-pressure farming, was one of economy of production on the farm.

I think you are familiar, are you not, with his theory in that regard?

Dr. MOSEMAN. Well, not too much so, Mr. Marshall. I did know Professor Boss, but it was in his later years and I was not too well acquainted with his concepts.

Mr. MARSHALL. Doctor, would you tell me what your Department has been doing in pasture development and forage development?

Dr. MOSEMAN. We have been carrying on research on the improvement of varieties of alfalfa and other forage crops and also are conducting some studies on forage production practices.

NEED FOR FORAGE RESEARCH IN SOUTHEAST

Now, the item that we have in our budget and to which you may be referring, as far as our increases are concerned, are designed essentially to carry out what I understand Professor Boss was interested in, for the southern part of the United States. In that area we have extremely long growing seasons and can have almost year-round grazing. It has been estimated that if farmers there could take full advantage of forage and pasture that they could cut their cost of feeding their beef cattle to about $25 per head, as contrasted with using large amounts of grain supplements. The problem that we have there is developing suited varieties that have resistance to disease and varieties that will be compatible in mixtures of grasses and legumes. You are probably familiar with the alfalfa and brome grass mixtures in your section. We do not have the kind of grass that will do well in some of the coastal plains areas or in certain sections of the Piedmont. If we use lespedeza in our mixtures, we have the problem of high tannin content and low palatability of the lespedeza. The Coastal Bermuda grass is too vigorous and persistent so you cannot use it effectively in rotations. We have tried using various clovers with Dallis grass and these combinations are very palatable, but they present problems of bloating, caused by heavy dews on the pastures.

So it is a problem of trying to develop the right kind of grasses and legumes, and then getting those into the proper combinations. Once we get the right combinations, we must develop management practices, which are primarily proper fertilization, deferred grazing, and other types of management that will maintain those combinations.

PROTEIN CONTENT OF GRASSES

Mr. MARSHALL. What have you been doing toward increasing the protein content of certain grasses? For example, timothy, have you been doing anything along that line?

Dr. MOSEMAN. We have not been doing as much as we should, Mr. Marshall, because we have found that some of the recent releases, for instance, Alta fescue, and some grasses of that type are very low in palatability. It has only been relatively recently that we have initiated cooperative studies with the Bureau of Dairy Industry, the Bureau of Animal Industry, and some of the State experiment stations to make tests on the nutritional value of some of these strains. There, again, I believe the soil research comes into the picture very heavily, Mr. Marshall, because you can modify the nutrient content of your crop of grasses to a certain extent by your fertilizer practices.

Mr. MARSHALL. Mr. Chairman this is a field that I do not intend to indicate in any way that the Bureau has been lax, because I think it has been a matter of a trend in the other direction, which has forced farmers toward this so-called high pressure type of farming, but I believe, at the same time, it would be highly desirable if the Bureau would give more attention to that phase of the work, because I sincerely believe the farmers will profit greatly by a trend in that direction.

Mr. ANDERSEN. And what is more important, Mr. Marshall, it will build up our soil in the future.

Mr. MARSHALL. Yes. This is not a 1-year proposition by any means, and I think, too, that while we know about the protein content of our legumes, we have so much of our soil that does not produce legumes but which would produce a grass, if that grass could be developed that would have more digestable nutrients, if I am not mistaken. A grass such as timothy which is very low in protein, can be developed to a high protein content. Of course, the hardiness of timothy is well understood in our particular area.

Mr. ANDERSEN. Doctor, I once had the pleasure of going over the King Ranch in Texas, and I saw there an illustration of what you can do with forage and the proper kind of pastures. It was a remarkable exhibition so far as I was concerned.

I will yield to Mr. Whitten at this point.

Mr. WHITTEN. My question is along somewhat different lines, Mr. Chairman.

REVIEW OF RESEARCH PROGRAMS BY COMMODITY COMMITTEES

I would first like to know what percentage of your activities are reviewed by people in industry, or in private business, as represented on the advisory committees?

Dr. MOSEMAN. All of our field crop research, Mr. Whitten, all of the horticultural crop research, and just recently there has been an advisory committee set up to consider soils research.

Mr. WHITTEN. What percentage of your operations is that?

Dr. MOSEMAN. At the present time, if we would include the soils work in the committee review, which we are getting, I would say probably 80 to 85 percent.

AMOUNT INCLUDED FOR BASIC RESEARCH

Mr. WHITTEN. Can you tell me what percentage of your effort is directed toward meeting immediate problems and those problems which these commodity committees work with, and what percentage concerns long-range problems?

Dr. MOSEMAN. I believe the best breakdown we could give there would be the amount we are spending on fundamental or basic research, and that is about 15 percent of our total funds.

INCREASED YIELDS FROM RESEARCH PROGRAM

Mr. WHITTEN. Doctor, this committee has had for several years a very fine showing as to the needs in future years for more land than we now have. This shows that we must either reclaim land or continue to make progress toward increased yields per acre.

I think, Mr. Chairman, we should have in the record a statement showing for the last 20 years the work that you do, and an estimate of the increased yields as a result of research, investigation, and experiments with new plants.

Mr. ANDERSEN. Will you put that in, Dr. Moseman?

Dr. MOSEMAN. Yes, sir.

(The information requested is as follows:)

INCREASES IN CROP YIELDS

Today crop yields per harvested acre average about 45 percent more than they did in 1930. This increase becomes even more striking when compared with only a 5-percent increase in average yield for the 20-year period from 1910 to 1930. The increased productivity has been achieved in spite of continuing soil erosion, newly discovered destructive plant diseases and insects, and shifts to submarginal land during emergency periods. The increase in quantity produced has been accompanied by improvements in the quality of the product. Likewise, the overall efficiency of production has been improved. Our crops today, even perishables, hold up well when shipped long distances. The spectacular yield increases resulting from the innovation of hybrid corn are well known. Changes in productivity rates for several crops for the same period are shown below.

Commodity	Average yield per acre			Percent change from 1935-39
	Unit	1935-39	1947-51	
Corn, all	Bushels	25.0	36.5	46
Wheat, all	do	13.2	16.6	26
Potatoes, white	do	117.5	228.9	95
Tobacco, all	Pounds	882.5	1,235.2	40
Cotton, lint	do	225.6	280.1	24
Rice	do	2,234.0	2,203.0	−1
Soybeans, for beans	Bushels	18.1	20.6	14
Beans, dry edible	Pounds	856.0	1,105.0	29
Sugar beets for sugar	Tons	11.5	14.5	26

These increases have resulted from the complex interaction of a number of factors, including economic conditions, favorable weather, improved managerial ability of producers, and the availability of crop varieties and methods of production with an inherently higher productive potential. Because of the interplay of factors it is difficult to estimate accurately the increase due to research. Because of the cumulative effects of research, today's crop varieties have a higher yield capacity. Plant breeders have incorporated insect and disease resistance in the new varieties as well as the ability to withstand drought, extreme temperatures, and other production hazards. Research has produced in many instances crop types especially suited to mechanical harvesting. Simultaneously soil scientists have developed improved soil-management systems, better fertilizers, and other practices to get the maximum expression of the yielding potential and the greatest economic output per acre consistent with sustained productivity of our soils. Research engineers have developed the equipment and machinery needed to take advantage of the biological innovations both as to cost and timeliness of cultural operations. General economic conditions, labor shortages, and the need for all-out production in emergency periods have accelerated the adoption by farmers of the improved techniques.

COMPARISON OF LAND LOST TO CROP PRODUCTION AND COST OF RESEARCH

Mr. WHITTEN. I also would like, Mr. Chairman, to point out with regard to these various fields in which this group works, the amount of the annual loss in dollars and quantity as a result of plant diseases in wheat, cotton, and the various other crops. I would like to have included in the table an indication of the number of acres of land that are no longer capable of producing the plants that have heretofore been

grown on that land. I am requesting this information to show the greatness of this problem and the amount of loss that we have as a result of disease in comparison with the total cost of research on these problems.

(The information requested is as follows:)

ESTIMATED LOSSES FROM DISEASES AND ANNUAL COST OF RESEARCH

The following tabulation shows estimates of certain crop losses due to some of their diseases in 1952 and the approximate allotments of funds in the Bureau of Plant Industry, Soils, and Agricultural Engineering for all production, breeding, disease, and improvement research relating to those crops.

Crop	Disease	Estimated loss in 1952	Allotment for crop research fiscal year 1953
Field crops:			
Wheat	Stem rust	$16, 875, 000	
	Bunt	6, 500, 000	
	Mosaic	3, 100, 000	
		26, 475, 000	$468, 100
Cotton	Verticillium	40, 000, 000	
	Seedling diseases	43, 000, 000	
	Bacterial blight	23, 000, 000	
	Fusarium wilt	14, 000, 000	
		120, 000, 000	534, 030
Tobacco	Black shank	[1] 15, 000, 000	
	Nematodes	25, 000, 000	
		40, 000, 000	341, 590
Horticultural crops:			
Apples	Scab and black rot	11, 000, 000	100, 000
Citrus	Virus and others	50, 000, 000	133, 100
Peaches	Brown rot, leaf, curl, phony peach	10, 500, 000	160, 000
Strawberries	Virus	15, 000, 000	40, 000
Potatoes	Late blight and virus	70, 000, 000	189, 340
Beans	Rusts, virus, and bacterial	12, 000, 000	100, 000
Peanuts	Root rot, leaf spots	25, 000, 000	40, 120
Cucumbers and melons	Mildew and anthracnose	12, 000, 000	29, 110
Tomatoes	Blight and leaf spot	25, 000, 000	90, 000
Ornamental crops	Virus, etc	37, 000, 000	242, 380
Forest trees	All diseases	50, 000, 000	381, 850

[1] North Carolina only; total loss in United States not available.

LOSS OF LAND FROM PRODUCTION

From alkali, poor drainage, erosion, etc., there are approximately 21 million acres of land under irrigation in 19 States west of the Mississippi River. In the period 1929 to 1939, 1 million acres of irrigated land were abandoned because of alkali, poor drainage conditions, and for other reasons. On much of the 21 million acres now irrigated the crop yields are reduced 10 to 20 percent by salinity or an excess of soluble salts in the soil, commonly referred to as alkali. Using all available sources of information the Soil Conservation Service has estimated that the equivalent in productivity of about one-half million acres of good farm land is lost each year through land damage and deterioration as the result of or produced by floods, soil erosion, and other forms of land damage.

From black shank disease of tobacco: In some cases the soil may become infected with disease organisms thus reducing the productiveness of the land. Black shank disease of tobacco is a good example. It has been estimated that in the States of North Carolina, South Carolina, Virginia, Kentucky, and Tennessee, 50,000 acres annually must be taken out of tobacco for at least 3 years, then returned to tobacco with the prospect of a 10 to 25 percent loss if susceptible varieties are used. While these 50,000 acres of land are not a total loss during the intervening years, they must be used for pasture or other crops.

From dwarf bunt of wheat: Dwarf bunt of wheat in the Pacific Northwest causes an annual loss of 6 to 10 million dollars and unless resistant varieties are used it is almost impossible to use the land for wheat once it becomes infected.

From nematodes: It has long been known that soil infested with plant parasitic nematodes is less productive than similar soil in which the nematodes have not become established. In a recent survey conducted by the Bureau it was estimated that 11,533,250 acres in 27 States were infested with root knot nematodes. It appears probable that root knot nematodes are present in about 500,000 to 1,000,000 acres of irrigated land in California. It has been estimated that in Kern County, Calif., alone, at least 100,000 acres of the best agricultural land are infested with this pest. The citrus root nematode is found on 90 to 95 percent of the citrus plantings in southern California and is widely distributed on citrus trees in central and northern California. Thus approximately 286,606 acres of citrus in California are infested. It is not uncommon for beet yields to be reduced 5 to 10 tons per acre by sugar-beet nematode. Approximately 50 percent of the California acreage of sugar beets is infested. With cotton alone, more than 20,000 acres of the 1952 crop in Arizona showed reductions in yield ranging from moderate to severe in many areas of the State. Establishment of the golden nematode on Long Island has removed about 11,000 acres of land from potato production.

From brush infestations: Another example of land loss is the case of brush in the Southwest. It has been estimated that brush, especially mesquite, has invaded some 50 million acres of range and pastureland. Some progress has been made on control methods, but there is need for further research to develop the information required for economical and permanent control of the brush and reestablishment of forage on these grazing lands.

TOTAL RESEARCH PROGRAM NEEDS

Mr. WHITTEN. How nearly do you meet your real needs? In other words, how much extra money would you need to really meet this problem of adequate research in your Bureau?

Dr. MOSEMAN. I believe, Mr. Whitten, to provide the soundest base for that answer to your question, it would be desirable to use the recommendations of the various industry advisory committees.

Mr. WHITTEN. What percentage of their requests are you able to meet with your present funds and how much additional would it take?

Dr. MOSEMAN. At the present time—this year—with the increases that we have in our budget estimates, we are covering about 25 percent of the urgent requests that the industry advisory committees presented in their last meetings. In other words, to implement their recommendations would require something over $3 million, and we have in our request a total increase of about $805,000, including $76,000 for the National Arboretum. At the time of their last meeting the committees were not considering the soil research program of the Bureau, so their recommendations related to only a part of our program.

BUREAU AND DEPARTMENT BUDGET REQUESTS

Mr. WHITTEN. What amount did you request of the Secretary for 1954?

Mr. BEACH. The request was $2,570,000.

Mr. WHITTEN. How much then was the request of the Bureau of the Budget and how much did they cut it?

Mr. BEACH. The request to the Bureau of the Budget was $1,341,072. Our budget allowance was $805,072, a reduction of $536,000.

Mr. WHITTEN. By asking these questions, I do not mean to agree with your figures. But we must make all these parts fit and we must do the best we can. I doubt if there is enough money in the world

to supply every person with an answer to all the problems that he has. But I do think it is helpful for us to have some idea of the magnitude of the problem and the smallness of the amount of money that may go toward meeting it.

Mr. ANDERSEN. Thank you, Mr. Whitten. I think that was very valuable.

INDUSTRY SUPPORT FOR ADDITIONAL FIELD CROPS RESEARCH

I have before me a statement from people interested in the breeding development of small grain, which I mentioned previously. They feel that we are about one-half million dollars short of what should be expended in this particular item, "Field crop investigations."

This group I am referring to is made up of hard-headed businessmen who feel that this is one place where we could spend a little additional money with great possible results to the future of our agricultural economy.

TOBACCO RESEARCH PROGRAM IN WISCONSIN

Mr. LAIRD. Our Wisconsin congressional delegation has been requested to look into the matter of research for tobacco production in Wisconsin. In the last few years the Wisconsin State government has set aside $25,000 for tobacco research. We have had certain problems in the production and marketing of a suitable tobacco leaf in our State. What work has been done by you on that particular project?

Dr. MOSEMAN. We have had a man located there for a number of years, Mr. Laird, and he was concerned with developing a type of plant that would be suited for growing under your conditions in Wisconsin, with disease control and production practices. The problem that I think your folks are most concerned about now is related to the burning quality of tobacco. They have difficulty in finding a good market for their tobacco. We feel that burning quality may be related to the nutrition the soil furnishes to the plant, and we have been working with the people at the Wisconsin station in trying to develop a joint program there that will help us to find out what the problems and answers are.

Mr. LAIRD. Does your program call for any help financially on that project?

Dr. MOSEMAN. We are putting some money in that, about $4,000 this year. It is not a large amount, but it is supplementing what the Wisconsin station is putting in.

Mr. LAIRD. The reason that I have asked these questions is that Wisconsin farmers some years ago were encouraged to go into tobacco production. Is tobacco a product we should be producing or not? Will you give me a report on the information you have developed?

Dr. MOSEMAN. Yes, sir. I will be glad to put in a statement about the situation for the record.

(The statement referred to follows:)

THE PROBLEM OF FIRE-HOLDING CAPACITY OF WISCONSIN TOBACCOLEAF

The fire-holding capacity or burning characteristics of all tobaccoleaf used for making cigars, cigarettes, and pipe-smoking tobaccos has long been recognized as a most significant quality consideration. The fire-holding capacity of these tobaccos is regularly determined in all research associated with production, breed-

ing, curing, and handling problems, since these practices influence this quality characteristic. In certain areas of production, the problem is one of determining the extent of fire-holding required and the relative costs of handling methods or of soil treatments necessary to produce a burn quality acceptable to the trade. In Wisconsin, and to a lesser degree in some other cigarleaf and burley-production areas, the problem is more complex. A critical condition has developed in the three major producing counties of Wisconsin where cigarleaf is grown. The fire-holding capacity of the tobaccoleaf is frequently too low for making cigars, and it has to be diverted to other use, resulting in reductions of 50 percent in farm value and income from the crop. The problem is complex, apparently related to local conditions and appears to be more critical in Wisconsin than in other areas at this time.

BUREAU RESEARCH ON TOBACCO QUALITY

Within the funds and resources available, the Bureau has intensified its research program on regional quality studies, considering the fire-holding capacity of tobacco leaf as most significant. The Bureau, in meeting with the Tobacco Advisory Committee of the Department, for the past 5 years has recognized the fire-holding capacity problems of tobacco leaf and is fully aware of the serious situation in the 3 tobacco-producing counties of Wisconsin. While the Bureau has been concentrating support primarily on regional aspects of the research program, there has been a cooperative effort with the University of Wisconsin to intensify the research on the plant-soil relationships in their specific problem area. A series of conferences with the Wisconsin Agricultural Experiment Station has resulted in the drafting of a joint State-Federal program whereby the State will place more emphasis on the local plant-soil relationship problem. The Bureau is continuing to cooperate with the State on problems of regional significance and is providing $4,000 for the joint program, covering all phases of tobacco research in Wisconsin. The Bureau, in counsel with the Tobacco Advisory Committee, has recognized the need for more extensive and intensive research into the plant-soil relationships to evolve an understanding of the basic principles relating to the low fire-holding capacity of tobaccos produced on these special soil types; however, it has not been possible to extend the research program for such a study.

FEDERAL RESEARCH PROGRAMS PRIMARILY CONCERNED WITH REGIONAL PROBLEMS

Mr. WHITTEN. It has been my understanding through the years that the research work of this Bureau has been directed toward cooperating with regions of considerable size. Would that possibly be the reason that you have been unable to meet this problem in this area as you have in some others?

Dr. MOSEMAN. That is the principal reason, Mr. Whitten, because we have been concentrating out efforts on regional problems and in the principal tobacco-growing areas where the different States from Florida on northward have similar problems. The situation in Wisconsin is a critical one, but it is somewhat more localized and specific; it is within a State and we feel that we would like to see the State experiment station do as much of that work as possible, although we are providing about $4,000 for the support of the work there.

FIELD CROP INVESTIGATIONS

NUMBER OF POSITIONS UNDER PROPOSED INCREASE AND DESCRIPTION OF THEIR WORK

Mr. ANDERSEN. With regard to the item "Field-crop investigation," doctor, I would like for you to insert in the record the number of additional people you are proposing with the $364,000 increase requested here. Also describe the special work which you plan to strengthen with these people.

(The information requested follows:)

PERSONNEL TO BE EMPLOYED UNDER PROPOSED INCREASE OF $364,000 FOR FIELD CROP INVESTIGATIONS AND THEIR DUTIES

This increase provides for three fields of research as follows:

	Number of positions	Amount of increase
For sugar-beet and sugarcane production research	34	$200,000
For studies of cotton defoliation and weed control in cotton to promote mechanized production	20	100,000
For improvement of pastures and forage crops in the South	12	64,000
Total	66	364,000

The details for each increase are as follows:

1. Increase of $200,000 for breeding superior varieties of sugar beets and sugarcane having multiple disease resistance, hybrid vigor, high sucrose, outstanding keeping qualities in storage, and adapted to mechanized field operations.—The 34 new positions provided under this increase would be divided approximately equally between research on sugar beets and sugarcane. In sugar-beet research the new personnel would be concerned with (1) breeding for resistance to virus yellows the most serious disease of beets in Europe and now found to be in the United States, and incorporating such resistance with resistance to curly top, black root, leaf spot, and other diseases, (2) incorporating nematode resistance into commercial varieties through the use of certain wild types of beets which have nematode resistance, (3) achieving hybrid vigor for commercially available beets so as to realize the same potential benefits as were realized with hybrid corn (hybrid beets have been produced experimentally), and (4) improving sucrose content purity of the juice, and root shape, and incorporating the character of forming only a single germ in a seed ball to facilitate mechanical planting.

In sugarcane research the new personnel would be concerned primarily with speeding up the development of improved disease resistant varieties. The urgent demand for new sugarcane varieties prevails in large degree because yields of the same variety deteriorate under ordinary production practices. A variety that is outstanding today will probably be useless 10 years from now. New sugarcane varieties must be erect-growing to meet the needs for mechanical harvesting. This one factor eliminates large quantities of breeding material which do not grow sufficiently erect. A new disease, sclerospora, has been found in Louisiana. The disease is particularly serious because it completely stunts the plant and makes it worthless. Other diseases usually lower production, but do not cause complete loss. The presence of the disease is causing some reduction in new plantings. Research is needed to learn how it spreads, how it can be controlled, and to develop resistant varieties.

The new positions are distributed by geographic location as follows:

	Number of positions	Amount of increase
(a) Salt Lake City, Utah	6	$35,000
1 geneticist, GS–11, would conduct basic research on the genetic factors of hybrid vigor, the nature of complete male sterility necessary for commercial hybridization, and the genetic factors associated with superior quality. 1 agronomist, GS–9, would work with the geneticist in evaluating new and superior strains of sugar beets under field conditions. 1 pathologist, GS–9, would work with the geneticist in studying the inheritance of resistance to the various diseases of sugar beets, to insure that new hybrid varieties will have adequate capacity to withstand potential epidemics of the important diseases. 1 physiologist, GS–9, would work with the geneticist in studying the inheritance of physiological characters that determine processing quality in sugar beets. These 4 professional employees would be assisted by a subprofessional aid, GS–5, and a clerk-typist, GS–3.		
(b) Fort Collins, Colo	3	20,000
1 agronomist, GS–9, would conduct research toward developing superior pure lines of sugar beets that are essential for the production of hybrids. 1 physiologist, GS–9, would carry out research on the physiology and biochemistry of new and promising pure lines of sugar beets and their hybrids in the search for new hybrid varieties of superior processing quality. 1 pathologist, GS–9, would conduct research on the disease resistance of new pure lines of sugar beets and their hybrids so that newly developed hybrid varieties will have adequate disease resistance for the area in which they are grown.		

	Number of positions	Amount of increase
(c) Salinas, Calif.	3	$20,000
1 physiologist, GS–12, would study the environmental factors—weather, soil moisture, fertility—that condition the adaptability of a variety of a given area, and would evolve practices that produce beets of a given variety having physiological and biochemical characteristics essential for optimum processing quality. 1 agronomist, GS–9, would work with geneticists and nematologists toward selecting adapted lines of sugar beets having superior resistance to nematodes. They would be assisted by an agricultural aid, GS–5.		
(d) East Lansing, Mich.	3	15,000
1 physiologist, GS–9, would conduct research in cooperation with the agronomist and pathologist to evaluate the key factors determining the stand of plants obtained in a field after planting. Maximum benefit from the breeding of superior varieties necessitates adequate information on the conditions essential to permit optimum development of the varieties.		
1 agronomist, GS–9, would work with the physiologist, pathologists, and geneticist at the station in evaluating under field conditions new and superior varieties of sugar beets that may be adapted to the humid areas of the United States. They would be assisted by an agricultural aid, GS–3.		
(e) Houma, La.	8	40,000
1 physiologist, GS–12, would study the factors involved in the flowering of sugarcane so as to develop means of artificially inducing flowering, a development seriously needed by sugarcane breeders. 1 pathologist, GS–11 and 1 pathologist, GS–7, would conduct research on the ratoon stunting disease and other diseases that may be factors in the serious deterioration in variety yields continually taking place. Variety "deterioration" is the key factor in the pressure for an expanded breeding program. 1 agronomist, GS–9, would aid in the evaluation of the agronomic characters of new seedlings coming from the expanded breeding program. These professional men would be assisted by 3 agricultural aids, GS–4 and GS–3, and 1 clerk-typist, GS–3.		
(f) Canal Point, Fla.	5	30,000
1 agronomist, GS–9, would aid in the cane-breeding program being conducted at this station, and would test promising new seedlings or field adaptation to Florida conditions.		
1 physiologist, GS–9, would aid in the cane-breeding program and cooperate with the GS–12 physiologist at Houma, La., in finding practical means of controlling flowering in keeping with needs of breeding program. 1 pathologist, GS–9, would supervise inspection of imported sugarcane varieties to be grown in a secondary quarantine station; inspect for diseases the variety collection maintained at Canal Point; and would evaluate disease resistance of new seedlings developed for Florida conditions. These 3 professional employees would be assisted by 2 subprofessional aids, GS–4.		
(g) Meridian, Miss.	1	10,000
1 agronomist, GS–9, would culture and evaluate sugarcane seedlings grown from seed produced outside continental United States. This will permit culture of imported seed outside of commercial sugarcane areas. Imported seed is an important potential source of improved varieties.		
(h) Beltsville, Md.	5	30,000
1 agronomist, GS–13, is needed to assist the division head in supervising the sugarcane project. 1 pathologist, GS–9, would conduct research on the basic nature of sugar-beet diseases. It is urgent that this line of research be reestablished and tied in with studies on sugar-beet genetics now carried on at Beltsville. 3 clerks, 1 GS–4, and 2 GS–3, would assist these 2 professional employees and would provide for the increased common staffing services at the central headquarters incident to this program increase.		
Total	34	200,000

2. *Increase of $100,000 for research on cotton defoliation and weed control in cotton to promote mechanization.*—The 20 new positions provided under this increase would be divided approximately equally between fundamental studies to determine better methods of inducing defoliation of cotton leaves prior to harvesting and the development of better methods of weed control in cotton through the use of chemical herbicides. Almost 30,000 cotton harvesting machines were used to harvest the 1953 crop. Frequently mechanical harvesting reduces the grade of cotton because of leaves and trash collected with the cotton. Basic research is needed to develop more efficient defoliants and methods and better understanding of the effects of cultural practices. Chemical herbicides for cotton production are still far from satisfactory. The herbicidal action of new pre- and post-emergence chemicals need to be tested to determine more effective weed control measures so as to remove this major obstacle to the effective mechanization of cotton production.

The new positions are distributed by geographic location as follows:

	Number of positions	Amount of increase
(*a*) Sacaton, Ariz. 1 physiologist, GS–11, would study defoliation problems, irrigation culture for mechanization, and plant-moisture relationships. 1 agronomist, GS–7, would study the behavior of various herbicides under irrigation. They would be assisted by a subprofessional aid, GS–3.	3	$15,000
(*b*) Shafter, Calif. 2 physiologists, GS–9, would work in cooperation with UCLA on developing more efficient defoliants, on finding means of controlling boll shedding to provide better adaptation for mechanization in the hotter western irrigated valleys, and on studying the effects of various herbicides. They would be assisted by an agricultural aid, GS–5.	3	18,000
(*c*) College Station, Tex. 1 physiologist, GS–7, would be added to work in cooperation with the State on basic defoliation research and on chemical control of fruiting in cotton.	1	5,000
(*d*) Lubbock, Tex. 1 physiologist, GS–7, would study defoliation requirements for low-temperature, short-season mechanized culture in the stripper-harvester area.	1	5,000
(*e*) Mariana, Ark. 1 physiologist, GS–7, would be added to expand the basic work on second growth control and the work of developing a more efficient and reliable small scale test method for determining defoliant efficiency.	1	5,000
(*f*) Stoneville, Miss. 1 agronomist, GS–12, would study the behavior of herbicides under humid conditions and the relationship of soils and weather to plant reactions. A chemist, GS–7, would conduct basic physiological studies on cotton insecticide toxicity, biochemistry of defoliation, and control of second growth. They would be assisted by 2 agricultural aides, GS–3, and 1 clerk-typist, GS–3.	5	20,500
(*g*) Athens, Ga. 1 physiologist, GS–7, would work in cooperation with the State on the basic physiology relating to low temperature vigor of seed and seedlings.	1	5,500
(*h*) Raleigh, N. C. 1 physiologist, GS–9, would make basic physiological studies of the effects of herbicides on the cotton plant, when grown in the East.	1	9,000
(*i*) Beltsville, Md. 1 agronomist, GS–9, would be added for basic research on the development and testing of new herbicides effective for weed control in cotton. He would be assisted by an agricultural aide, GS–5. 2 clerks, GS–3, would be added at central headquarters to provide for the increased common staffing services for the program.	4	17,000
Total	20	100,000

3. *Increase of $64,000 for improvement of pastures and forage crops in the South.*—The 12 new positions provided under this increase would be concerned with the improvement of forage crop varieties and pasture management for the South where the potentials for grassland agriculture and livestock production are so great. Good forage varieties for many areas are not available. Loss from diseases have been high and the cost of establishing stands is great. New varieties, such as coastal Bermuda grass which proved to be outstanding in last season's drought, need to be developed. Supplemental irrigation offers promise, but research is needed to determine its place.

The new positions which would be added generally where some work is already underway, are distributed by geographic location as follows:

	Number of positions	Amount of increase
(*a*) Auburn, Ala. 1 GS–7, pathologist, would be added to work on the diseases of clover. He would cooperate with the State workers who are presently carrying on clover improvement work without the aid of a pathologist.	1	$6,500
(*b*) Osceola, Ark. 1 unclassified agent and 1 GS–3 clerk are proposed to carry out the new work at this location. It would be concerned with the alfalfa-growing problems of this Mississippi Valley area where dehydration was once an important industry. Due to crop failures or unprofitable production, the number of dehydrators in the Missouri-Tennessee-Arkansas areas has dropped from more than 20 to 3.	2	7,950

	Number of positions	Amount of increase
(c) Gainesville, Fla.	1	$5,500
1 GS–7 agronomist would be employed to restore work on pasture management and methods of establishing legumes and grasses adapted to the Deep South, typical of the subtropical region. Until 1950, the Bureau had a limited pasture and range program in Florida.		
(d) Tifton, Ga.	2	11,650
1 GS–7 agronomist and one GS–4 agricultural aide would be added to expand and round out the grass and legume breeding and pasture program that serves the lower Coastal Plain.		
(e) State College, Miss.	2	9,450
1 unclassified agent and 1 GS–4 agricultural aide would be added to strengthen and expand the breeding, improvement, and testing of grasses and clover now conducted at this location.		
(f) Raleigh, N. C.	2	9,500
Fundamental work on pasture management and evaluation techniques is now under way at this location. 1 GS–9 agronomist would be added to carry on agronomic-physiologic work with pasture plants. A GS–3 clerk would be added to assist in keeping records obtained from this work.		
(g) Stillwater, Okla.	1	6,950
The present staff at this location would be expanded by adding 1 GS–4 agricultural aide and other part-time help to assist in carrying on research to determine the effect of processing seeds to remove appendages that interfere with handling, testing, and seeding through existing machinery on their viability and stand establishment.		
(h) College Station, Tex.	1	6,500
1 agronomist, GS–9, would be added to the limited legume improvement program now conducted at this location to expand the breeding and testing work and the development of low tannin lines of *Sericea lespedeza*.		
Total	12	64,000

Horticultural Crop Investigations

Mr. Andersen. Under "Horticultural crops" we have an increase in the amount of $125,000 for the purpose of strengthening research on citrus products and especially diseases, such as tristeza. Will you comment on that? What is the latest situation on that particular disease?

INCREASE FOR RESEARCH ON CITRUS DISEASES

Dr. Moseman. As you may recall, Mr. Chairman, the Congress provided $27,500 in 1947 to study the tristeza disease in Brazil in order to get more background information on how to identify it, its means of spreading and to get some information on resistant root stocks and all in all to enable us better to meet the problem, if and when it reached this country.

Mr. Andersen. That is along the line I suggested to you previously in this hearing. That should be done as preventive work.

NEW CITRUS LABORATORY AT ORLANDO, FLA.

Has the construction of the laboratory at Orlando been completed?

Dr. Moseman. That is scheduled for completion sometime in May, or at least by the 1st of June. We should be in it at the beginning of the next fiscal year. That will provide the laboratory facilities for the work on tristeza and these other "decline" diseases. The laboratory now under construction will not provide the necessary greenhouse facilities for the work under the budget increase and our request here includes the funds that we feel would provide the greenhouse and screenhouse that we will need so that we would not get a spreading of the disease from our research center.

Mr. HORAN. How is this work progressing down in Florida?

Dr. CULLINAN. Well, this tristeza problem just hit Florida this past year. The disease was definitely identified as being present in Florida.

Mr. ANDERSEN. Is that what you mean by "quick decline"?

Dr. CULLINAN. Yes, sir; that is the quick decline, and that name was applied in California. The reason we call it tristeza is because that was the name that was given it by the Portuguese-speaking people when it was first discovered in Brazil and, since that was the original name, it has been carried on. California called it "quick decline," and it is possible that it should be called a different name there. In citrus there are a number of decline troubles of unknown cause. The trees may live for years and be unproductive, but trees infected with "quick decline" die suddenly. The virus causing the disease does not seem to be quite as virulent in California. The disease does not seem to be spreading as rapidly there as it has in Brazil.

Mr. HORAN. I think the subcommittee would like to have a little more on that.

Is this the disease that hit the citrus fruits some 4 or 5 years ago? When they unloaded a shipment in London they found the fruit to be highly deteriorated?

Dr. CULLINAN. No, sir; this does not affect the fruit to that extent. That was something else, probably some breakdown or post harvest decay. This is a virus disease of the tree and, of course, it does affect the fruit on the tree in its dying condition; the wilting will affect the quality of the fruit.

Mr. HORAN. Are you familiar with the quick breakdown of perishables at the market level?

Dr. CULLINAN. Yes, sir.

Mr. HORAN. There is no relationship between this; this is fundamental with the plant itself?

Dr. CULLINAN. That is right.

Mr. HORAN. And the other is something that would affect the seed?

Dr. CULLINAN. It is a breakdown of the tree.

Mr. ANDERSEN. What is the extent of damage in Florida from this particular disease?

Dr. CULLINAN. In California about 500,000 trees have been killed and in Florida it has been found in practically all of the citrus-producing counties. There has not been a complete survey made. It was first identified last May and definitely determined to be tristeza. About 30 percent of the citrus in Florida is propagated on sour-orange rootstock and this is a disease of the sour-orange stock. In Texas where it has not yet appeared about 90 percent of the citrus is propagated on the sour-orange stock. So, if it hits Texas, you can see how serious it could be there. It seems almost inevitable that it will spread to Texas, because it is now in California and Florida.

Mr. HORAN. Who is in charge of the work down at Orlando, Fla?

Dr. CULLINAN. Dr. F. E. Gardner.

Mr. WHITTEN. Are these greenhouses essential to properly utilize this laboratory which you have put in?

Dr. MOSEMAN. Yes, Mr. Whitten these are additional facilities for the work under this increase. When we work with a disease of this kind, we want to be sure we can control the conditions so there is no danger of the escape of the insect vectors or the spread of diseased plant materials into surrounding commercial areas. We would take care of the construction cost of the greenhouses, about $25,000, out of the salary lapse which would occur during the initiation of the program in the first year. We would not put on all personnel until we had funds to build the greenhouses and screenhouses.

Mr. ANDERSEN. Do you have authority to make that transfer?

Dr. MOSEMAN. I do not believe that special authority is required.

Mr. ANDERSEN. Would you see that that is covered in the record?

Dr. MOSEMAN. Yes.

Mr. BEACH. The explanatory notes submitted in justification of the estimates involved, on pages 241 and 242, the explanation of the need for greenhouse facilities for this research. We wanted to be sure to call it to your attention.

(Information on the authority is as follows:)

AUTHORITY FOR CONSTRUCTION OF GREENHOUSES

The construction of greenhouses has been considered as the construction of research equipment and, since the frame and glass can be taken down and moved to another location, they have not been considered as a building subject to the limitations of Revised Statutes 3733 (41 U. S. C. 12). In a series of decisions rendered by the Comptroller of the Treasury April 16, 1907, and January 19, 1916 (41 M. S. Comp. Dec. 214; 76id. 291), and cited again by the Comptroller General of the United States in his opinion to the Secretary of Agriculture dated June 24, 1926, "it was held that glass structures and greenhouses, fumigating rooms and potting sheds in connection with greenhouses, erected for temporary purposes, are not public buildings or public improvements within the meaning of section 3733, Revised Statutes."

Title 5 United States Code, section 565a (September 21, 1944, ch. 412, title VII, par. 703, 58 Stat. 742), provides, "The Department of Agriculture is authorized to erect, alter, and repair such buildings and other public improvements as may be necessary to carry out its authorized work: *Provided*, That no building or improvement shall be erected or altered under this authority unless provision is made therefor in the applicable appropriation and the cost thereof is not in excess of the limitations prescribed therein." The annual appropriation to the Office of Administrator, Agricultural Research Administration, provides, "That the several appropriations of the Agricultural Research Administration shall be available for the construction, alteration, and repair of buildings and improvements: *Provided, however*, That unless otherwise provided, the cost of constructing any one building (*excepting headhouses connecting greenhouses* and experimental farm houses) shall not exceed $5,000, the total amount for construction of buildings costing more than $2,500 each shall be within the limits of the estimates submitted and approved therefor * * *." [Emphasis supplied.]

During the consideration of the 1938 Agricultural Appropriation Act, a change was authorized in the language of the "Salaries and expenses" subappropriation of the Bureau of Plant Industry, to provide for increasing the limitation on the construction of a "building" from $1,500 to $2,500, and at the same time there was added to such language after the word "building": "except headhouses connecting greenhouses". This was in recognition of the fact that it was occasionally necessary to erect headhouses connecting to greenhouses so that such headhouses formed a connecting range with a cost considerably in excess of the building limitation. No question was raised relative to the necessity for including greenhouses as exemptions from the limitation, presumably on the basis of various decisions that greenhouses were not subject to the limitation.

NUMBER OF POSITIONS UNDER INCREASE PROPOSED FOR CITRUS RESEARCH AND DESCRIPTION OF THEIR WORK

Mr. ANDERSEN. With reference to item II, I will want you to insert in the record at this point, Dr. Moseman, the number of people you are proposing to add with the requested $125,000 increase and a description of their duties.

(The information requested is as follows:)

Personnel to be employed under increase of $125,000 under "Horticultural crop investigations to strengthen research on citrus production, especially investigations of citrus diseases such as tristeza, or quick decline, to determine their cause and to develop control measures"

The 22 new positions required for expanding the research in this field would be distributed by geographic locations as follows:

	Number of positions	Amount of increase
1. Orlando, Fla.	10	$70,000
1 GS-9 horticulturist and 1 GS-9 plant pathologist would be added for the extensive testing required with rootstock materials to determine their resistance to the various diseases. The nature of various decline diseases would be studied intensively to determine the organisms or viruses causing them, how they spread, and methods of control. For this work 1 nematologist, GS-12, to study nematodes as a casual factor, and 2 plant physiologists, GS-12 and GS-11, would be required. To assist these professional employees, 3 agricultural aides, GS-4, to help with inoculation work and the taking of data would be needed, and 1 GS-5 clerk and 1 GS-3 clerk-typist.		
2. Weslaco, Tex.	4	20,000
Tristeza has not yet been found in Texas, but about 90 percent of the orange trees are propagated on sour-orange stock. Work is needed to evaluate suitable rootstocks other than sour orange and to test their adaptability to the more saline soils that occur in the Rio Grande Valley. Intensive studies would be inaugurated to determine where tristeza or quick decline is present. Special emphasis would be placed on finding the cause and control measures for Rio Grande gummosis. For these studies 1 plant pathologist, GS-11, to study the disease problems, 1 soil scientist, GS-9, to study the soil problems, and 1 horticulturist, GS-7, to handle the testing and propagation of rootstocks would be required. 1 agricultural aide, GS-5, and casual labor would be needed to assist them.		
3. Indio, Calif.	5	20,000
1 plant pathologist, GS-11, 1 soil scientist, GS-9, and 1 horticulturist, GS-7, would be required for work on the most urgent problems in diseases of citrus not being adequately covered by State research and on the decline diseases on lemons. Such work requires the services of scientists trained in plant pathology, soils, and horticulture. These professional employees would be assisted by 1 agricultural aide, GS-5, and 1 laborer.		
4. Beltsville, Md.	3	15,000
1 plant pathologist, GS-9, would be required to conduct basic research to study antagonisms between fungi, with possible finding of antibiotics for fungus-disease control. Studies would be made of various chemicals that might be absorbed by the plant that would reduce the virulence of virus diseases in plants. As basic information is developed, field tests by the workers at the different locations would be inaugurated to determine practical applications. 2 clerks, 1 GS-4 and 1 GS-3, would be added at central headquarters to meet the increased load on common staffing services.		
Total	22	125,000

FOREST DISEASE INVESTIGATIONS

RESEARCH IN LAKE STATES AND THE NORTHWEST

Mr. ANDERSEN. Now, we will go to item III, which has to do with research on forest diseases, particularly in the Lake States and the Northwest.

POLE BLIGHT DISEASE

Doctor, what is your latest picture on pole blight?

Dr. MOSEMAN. Well, the pole-blight situation is still extremely serious. It is one of the most destructive diseases we have in the Northwest.

The western white pine is the key timber tree in that section of the country and it is the principal tree on about 3.6 million acres. It produces a greater volume of wood per acre than any other tree growing in the area and it is estimated that the 10.8 billion board feet of merchantable white pine timber in the area is worth about $300 million at the current stumpage prices. We do not have the kind of information that we need to stop the spread of the pole blight disease, which is estimated to be spreading on about 10 percent of the acreage of the stands of these trees in Washington, Idaho, and Montana. We find up to 80 percent of the trees in some stands are affected by the disease and in some cases the actual mortality has reached as much as 25 percent.

Mr. ANDERSEN. Doctor, I think that adequately discusses that situation.

RELATION OF PROPOSED RESEARCH TO FOREST SERVICE ACTIVITIES

In your notes on page 243 you state that you wish to study such forestry problems as sanitation, cutting cycles, and clear cutting versus selective logging.

The Forest Service receives over $3 million a year for such research at 11 experimental stations and some 62 experimental forests. Are we not appropriating funds in two places for this very same work?

Dr. MOSEMAN. The work on forest diseases is entirely a part of our Bureau program. There is no program on forest diseases in the Forest Service.

Mr. ANDERSEN. I am referring to what you say on page 243. You refer to the effect of sanitation, cutting cycles and clear cutting in comparison to selective logging and other forest management practices.

This is work in relation to disease control, but I repeat again is that not almost exactly what the Forest Service is doing?

Dr. MOSEMAN. The Forest Service is working in forest management, which does include such things as selective logging versus clear cutting and practices of that kind and we work closely with them, in our research programs which provide the information on the effect of these different practices on development, spread, or control of diseases.

Mr. ANDERSEN. You take care of one phase of this particular work, is that right?

Dr. MOSEMAN. Yes, sir.

Mr. ANDERSEN. You are not duplicating work that is done by the Forest Service?

Dr. MOSEMAN. No, sir; we work with them through their regional offices. We provide the disease information and the effect of different management practices on the development of diseases.

Mr. ANDERSEN. I want you to insert in the record at this point the number of employees you propose in this project and what their duties will be.

(The information requested follows:)

Personnel to be employed under increase of $100,000 under forest disease investigations for research on their control particularly in the Lake States and the Northwest

The 16 new positions required for these investigations would be distributed by geographic locations as follows:

	Number of positions	Amount of increase
1. Lake States region:		
St. Paul, Minn.	6	$40,000
3 pathologists, 1 GS-11 and 2 GS-9, and 2 scientific aids, GS-5, would be employed to develop control measures for (1) aspen canker threatening the pulpwood industry, and (2) root rots and decays, and diseases limiting natural regeneration in forest stands of hardwoods and conifers. 1 clerk-stenographer, GS-4, would be required to do the typing and clerical work for the research program. Only 1 pathologist is now available to serve the Lake States region.		
In the Lake States, aspen canker is very destructive on ⅗ of all forested land. Aspen is the leading pulpwood source of the area and 41 paper mills depend heavily on a continuing supply. The industry has been greatly concerned with the problem and the need for developing methods for controlling it or reducing the losses from it.		
Heart rots cause a cull of over 10 percent of the saw timber of the Lake States and information is needed on the management of young stands to prevent entrance of heart rots, and on the relation of heart rots to the age of the tree to determine the profitable cutting cycle.		
The development of methods to prevent spread of mistletoe to young stands of black spruce, and methods to control a gall rust of jack pine which weakens young trees and impairs quality of logs and pulpwood bolts should also be developed for the Lake States area.		
2. Northwest region:		
(*a*) Missoula, Mont	6	40,000
3 pathologists, 1 GS-11 and 2 GS-9, and 2 scientific aids, GS-5, would be employed to determine the cause and control of pole blight disease of western white pine; and the control of decays, mistletoe, and other diseases of grand fir, western hemlock, western larch, and Engelmann spruce. 1 clerk-stenographer, GS-4, would be required to do the typing and clerical work for the research program. 1 pathologist, GS-7, is now stationed in this area.		
(*b*) Portland, Oreg	4	20,000
2 pathologists, 1 GS-11 and 1 GS-7, and 2 scientific aids, GS-5, would be employed to determine control measures for root rot of second-growth Douglas fir, which weakens the trees and makes them susceptible to blow-down and insect attack; the rate of decay of insect-killed timber (of which there are billions of feet) as a guide to the salvage program; and the control measures for virulent diseases of white cedar, hemlock, fir, and other conifers.		
The Portland staff is now limited to 3 pathologists and a clerk-stenographer. Over ¼ of the total standing saw timber of the United States is in the Northwest. Recent surveys of pole blight, a disease of unknown cause, shows that it is present and spreading on 10 percent of the acreage of pole-size stands of western white pine in Washington, Idaho, and Montana. Up to 80 percent of the trees in some stands are affected and mortality has reached 25 percent. The estimated annual production of western white pines is more than $65,000,000. An exhaustive study of pole blight would be made at once to determine whether it is caused by a virus, fungus, bacterium, or some other cause. Such information is necessary to the development of an effective control program.		
Experimental plots would be established in different age classes of the various host trees under study to observe behavior and spread of tree diseases under conditions prevalent in the forests. Tree age, class, and vigor, and site conditions, stand composition and density would be studied in relation to the incidence and severity of the disease. Studies would be conducted to determine conditions which are most conducive to disease intensification and methods formulated to reduce losses from diseases.		
The effect of sanitation, cutting cycles, clear-cutting versus selective logging, and other forest management practices in relation to disease control would be determined. Where the cause of the disease is not known, as with pole blight, the disease itself would be studied, since it is essential to know first whether or not a disease is infectious before intelligent control of a forest disease can be planned.		
Total	16	100,000

RESEARCH AGENCY RESPONSIBILITIES FOR FOREST DISEASES AND FOREST PESTS

Mr. HORAN. What is the relationship between the Forest Service, Plant Quarantine, and Plant Industry in this whole field of forest pests?

Dr. MOSEMAN. The Bureau of Entomology and Plant Quarantine has the responsibility for the control programs for forest insects and diseases. We are working with them on the surveys for plant diseases, that is, the actual detection and study of the plant diseases. There again, the Bureau of Entomology and Plant Quarantine has the responsibility for whatever control operations are undertaken to control the spread of those diseases. We, in essence, really provide the technical backstopping or the information for them on the disease phase of forest management. The Forest Service depends upon us for that information in their forest management work and the Bureau of Entomology and Plant Quarantine works closely with us to get that information for their disease-control work.

SPRUCE BUDWORM

Mr. HORAN. Now, we have a fourth element in relation to the spruce budworm out in our area, where the States and private industry, in addition to the Federal Government, are doing considerable work to control and eradicate that pest. How is such a program developed? Who takes the initiative in proposing such a cooperative program?

Dr. MOSEMAN. On that, Mr. Horan, I do not believe we have anything. We do not have any part of that particular program. It is an insect-control operation that, as far as I know, the Bureau of Entomology and Plant Quarantine is handling entirely from the Federal standpoint.

SOILS, FERTILIZERS, AND IRRIGATION, AGRICULTURE INVESTIGATIONS

INFLUENCE OF SOILS, FERTILIZERS, AND MANAGEMENT ON NUTRITIONAL VALUE OF PLANTS

Mr. ANDERSEN. I note that you ask for an increase of $100,000 in relation to the investigations into the influence of soils, fertilizers, and management practices on the nutritional value of plants.

I recall from previous testimony that the Bureau of Agricultural Economics, the Office of Experiment Stations, as well as the Bureaus of Animal Industry, Dairy Industry, Human Nutrition, and Home Economics are also engaged in research on this same subject.

How do you justify a further increase here?

Mr. HORAN. We have just the man to answer that—Dr. Parker.

Mr. ANDERSEN. All right, let us hear from Dr. Parker. Now, we have asked that same question of 3 or 4 different bureaus. It seems that this is something that has been seized upon as a fertile field. Will you comment on this, Dr. Parker?

LABORATORY AT ITHACA, N. Y.

Dr. PARKER. The Department of Agriculture established a laboratory at Ithaca, N. Y., in 1939 to study the relationships between plants, soils, and the nutritional value of crops.

That laboratory was transferred to our Bureau in 1950. At the same time the Research Administrator appointed a committee with repre-

sentatives from the four Bureaus which are concerned with one or more phases of this subject. The four Bureaus are Animal Industry, Dairy Industry, Human Nutrition, and Home Economics as well as Plant Industry, Soils, and Agricultural Engineering.

Mr. HORAN. And there is an item for BAE in there.

Dr. PARKER. That is another matter which we are coming to.

Mr. HORAN. All right.

RESEARCH PROGRAM REVIEW

Dr. PARKER. That committee was instructed by Dr. Shaw, the Research Administrator to consider this problem throughout the whole Research Administration. They have had seven 2-day meetings.

The first meetings were to consider the program of the separate Bureaus.

They spent 2 days reviewing the work of each of the 4 Bureaus and the laboratory so that they would be familiar with all of the ARA research in this field.

After they had done that they undertook to adjust some projects that were underway, and such adjustments have been made. Certain new projects have been started as a cooperative effort between two or more of the Bureaus.

In addition to that they prepared an estimate as to what was needed in order to bring this field of research up to a proper level of efficiency, and as a result of that you have before you estimates from the Bureau of Human Nutrition and Home Economics, the Bureau of Animal Industry, and this Bureau.

This was planned as a coordinated investigation of plant, soil, and nutrition problems. I would like to call your attention to the fact that it is a field of utmost importance. We have, in the past, given major consideration to the quantity of food and feed crops produced, but we have given inadequate consideration to the quality factor. Take, Mr. Chairman, your reference earlier to the breadbasket of the Nation. No part of the United States has suffered soil deterioration more than the Corn Belt and the Great Plains.

Mr. ANDERSEN. I think I agree with you, Doctor, because, after all, that is where you have the soil to lose in the first place.

Dr. PARKER. That is right.

The hybrid-corn program resulted in a big increase in corn production, with a 10-percent loss in protein content. The quality of our crops, as you know, has declined. The purpose of this item is to determine the effect on crop quality of such practices as intensive production, soil-management practices, fertilization, and plant breeding.

LOCATIONS FOR PROPOSED WORK

Mr. ANDERSEN. You mentioned the Ithaca laboratory, I believe.

Dr. PARKER. Yes, sir.

Mr. ANDERSEN. Would it not be best to concentrate this work in one place rather than split it up among 4 or 5 different bureaus?

Dr. PARKER. No, sir, we think not. The Ithaca laboratory is for the fundamental basic research, but this problem occurs in Texas. It occurs in Colorado, North Carolina, and in Florida. It involves studies of soils, plants, animals and human nutrition. To approach it

correctly, there must be a coordinated approach between the interested Bureaus, the Bureau of Animal Industry, the Bureau of Plant Industry, and the States. The Ithaca laboratory, for example, carried on one of its most intensive studies in North Carolina.

Mr. ANDERSEN. Well, I do not necessarily intend that the work all be done at the Ithaca laboratory, but you said that this fundamental basic research is conducted mainly in Ithaca?

Dr. PARKER. The basic research is largely conducted at Ithaca.

RESPONSIBILITY FOR RESEARCH PROGRAM

Mr. ANDERSEN. All right, why spread the responsibility for this particular research? Why not have it under one item regardless of whether you want to farm part of it out or not?

Dr. PARKER. That might be satisfactory but would probably involve allotments of funds between bureaus. The essential thing is to secure a coordinated investigation that utilizes existing facilities of the several bureaus and cooperating States.

Mr. ANDERSEN. Do you not think that a lot of these bureaus have already done considerable work along this particular line, and what is needed mainly is to bring together the results of research which has already been done by these various bureaus?

Dr. PARKER. That is what this committee spent 2 years doing, very carefully reviewing the work done by each one of the bureaus.

Mr. HORAN. I can appreciate Dr. Parker's reply, and I might add that Dr. Byerly, who is now the intrabureau chairman of the committee, testified on that very well.

PROGRAM OF BUREAU OF AGRICULTURAL ECONOMICS

Now, we have another thing here that is interesting. I want to note that under BAE we have an increase of $100,000 to determine the most profitable use of fertilizer, and down in the justifications it says:

> Farmers are now spending more than $1 billion a year for fertilizers and lime. They are using three and a half times as much fertilizer as before World War II, measured in plant nutrients. To find out how farmers can make the most profitable use of fertilizer is particularly important now because total production costs are rising faster than gross farm income.

I wish you would comment on that, because I could not escape the feeling that it was related.

Mr. ANDERSEN. I would say it is distinctly related.

Dr. PARKER. The Bureau of Plant Industry and the States conduct a large number of fertilizer experiments to determine the crop increase from the use of different kinds and amounts of fertilizer and lime. The economic interpretations of that in terms of dollars and return on investment is within the field of BAE activities. It is an important phase of their farm management and cost of production investigations.

Mr. HORAN. Will they not be working with your findings?

Dr. PARKER. Yes, they will be working with our findings and those of State experiment stations.

Mr. HORAN. They want $100,000 for this which does seem like a little money.

Dr. PARKER. We have done this already, Mr. Horan. For the past 3 or 4 years one of the men from BAE has been stationed with our

staff at Fort Collins, Col., to work on the economic interpretations of our fertilizer experiments. It is a very useful manner of tying together the results of physical research and their economic interpretation. It is also useful to have the asisstance of BAE in planning experiments. Joint planning assures that the results will be useful to both agencies. The increase, I am sure, is to expand that type of work.

Mr. ANDERSEN. That would be a considerable expansion, would it not, from one man up to a sufficient number to use up $100,000?

Dr. PARKER. I refer to the one man located with us. BAE has other men working in this field.

Mr. ANDERSEN. They have other people engaged in similar work?

Dr. PARKER. Yes.

Mr. HORAN. At the same time, the money that we are spending is taxpayers' money.

Mr. ANDERSEN. Would not the expenditure of this additional money produce more results if devoted to field-crop investigations—the breeding of new lines of grains, and so forth?

Are we utilizing our money in the very best possible places for the good of agriculture? I am not criticizing in any way the splendid work that you people are doing.

This particular Bureau now is basic, as far as agriculture is concerned.

Dr. PARKER. I am not qualified to give the answer to that question.

I would like to point out, however, that regardless of whether they are field crops or horticultural crops, soils are the basic thing from which those crops grow, and we must consider not only the yield of those crops, but we must consider the nutritive value of those crops.

Mr. ANDERSEN. That is, you have to have the right crops to put into the soil.

Dr. PARKER. That is right.

Mr. ANDERSEN. I agree with you, and it is a question of which comes first, the hen or the egg. Of course, in my opinion the kind of a crop to put into that soil is the thing that should be considered first. If I wanted to boost the field production a little bit I would naturally go to fertilizers.

Mr. HORAN. Economic interpretation of agricultural research is going to be done not only next year, but has been going on for decades since BAE was established. Presumably we have had economic interpreters at work for a long while. I am not completely satisfied with the justification for the increase requested in relation to this very important field in this well conceived project. What is the need exactly; what is the justification for this $100,000 additional in BAE? Presumably we already have plenty of economists in BAE. Would you reply to that Dr. Clarkson?

Dr. CLARKSON. Mr. Horan, I am only generally familiar with the BAE justification for this increase since economic research is not within the Research Administration.

Mr. Wells, Chief of the Bureau of Agricultural Economics has responsibility for economic research. However, we do recognize the very great importance of having an economic evaluation of the results of our physical experimentations and studies, because as Dr. Parker has so well stated, it is becoming more and more important that the economic factors be understood before new practices are put into the hands of farmers to use.

Mr. HORAN. I think we are in agreement on the need for economic evaluations of the scientific studies; however, what we are trying to justify here is the increase.

Dr. CLARKSON. Yes, sir.

Mr. HORAN. It has relation to the work that is being done in Ithaca.

ACCOMPLISHMENTS DURING CURRENT FISCAL YEAR

Mr. ANDERSEN. Now, Doctor, what is now being accomplished with the $2,696,000 already available this fiscal year for this particular type of work? What use have you made of the additional $175,000 authorized for this purpose last year?

Dr. PARKER. The allotment of $2,696,000 covers all of the work in soil management, water management on farms, the control of erosion, investigations in fertilizer technology, and basic or fundamental research in soils.

It does involve at a number of locations the use of fertilizers, but it is the broad soil-management program, of which approximately one-half of it is in the irrigated dry-land regions. There are irrigation investigations in 15 Western States. The most extensive studies are on Federal reclamation projects in the Columbia Basin, the Lower Colorado River Basin, and the Missouri Basin. It includes the work of the United States Salinity Laboratory and the Southwestern Irrigation Field Station, both in California. There are mountain meadow investigations in Colorado and Wyoming. There is dry-land rotation, tillage, and erosion control investigations in 12 States of the Great Plains and the Northwest. In the humid region most of the work is on the control of soil erosion, projects recently transferred from SCS.

Mr. ANDERSEN. But the amount is comparatively small, is it not, so far as the East is concerned?

Dr. PARKER. It was rather small until the reorganization work which took place last November and the work of the Soil Conservation Service was transferred to our Bureau.

GEOGRAPHICAL DISTRIBUTION OF SOILS RESEARCH WORK

Mr. ANDERSEN. Dr. Parker, how much of this $2,696,000 would you say is spent exclusively in the arid areas of the Northwest? The bulk of this money is expended, you might say, in the reclamation area, is it not?

Dr. PARKER. No, sir; I think not.

Mr. ANDERSEN. Just how is it broken down?

Dr. PARKER. If you take the irrigated work, the work on irrigation, I would judge would be around $700,000.

Mr. ANDERSEN. Where is that expended?

Dr. PARKER. In the arid Western States.

Mr. ANDERSEN. Now, where is the other $1,800,000 expended this year? That is the bulk of it.

Dr. PARKER. There are considerable expenditures for dry-land-soil-management research in the Great Plains and the Northwest.

Mr. ANDERSEN. That is what I assumed to be the same general region; that is what I had in mind.

Dr. PARKER. Yes; as far as the region is concerned. I thought you mentioned reclamation and irrigation.

Mr. ANDERSEN. No; I am referring to the area west of the Nebraska-Kansas line. The bulk of this money goes into that area; does it not?

Dr. PARKER. In the 17 Western States.

Mr. ANDERSEN. Yes.

Dr. PARKER. We can put in the record exactly what this breakdown is.

Mr. ANDERSEN. Yes, if you will.

(The information requested is as follows:)

Distribution of soil management research by geographic areas

Soil management investigations:	
17 Western States	$1,040,742
All other States	882,698
Total	1,923,440
The balance of the soil research funds are distributed as follows:	
Research on relationships of saline and alkali soils and irrigation water to plant growth (primarily conducted at Salinity Laboratory, Riverside, Calif.)	125,200
Investigations of the relation of soils to plant, animal, and human nutrition (primarily at Ithaca, N. Y.)	135,520
Basic soil plant relationships, including tilth, moisture, fertility, and soil organisms (primarily at Beltsville, Md.)	165,570
Fertilizer research (primarily conducted at laboratory in Beltsville, Md., or in cooperation with Tennessee Valley Authority at Wilson Dam, Ala.)	346,270
Total, soils, fertilizers, and irrigation agriculture investigations	2,696,000

EMPHASIS ON PROGRAM IN RELATION TO ITS IMPORTANCE

Mr. ANDERSEN. Coming back to my former question of today, and I am calling this to Dr. Moseman's attention, are we allocating sufficient thought in this particular Bureau to these great field crops which constitute the bulk of our agricultural income? Here in this one particular field, Doctor, Congress has given you $2,696,000 for the 1953 fiscal year. And in field-crop investigations having to do with the great segment of agricultural production in America we are expending scarcely more than a million dollars more than is being requested for soil-management research. Again, I must ask if we are giving the proper emphasis that we should to field crop investigations, as compared to this less significant research item.

Dr. MOSEMAN. That is a good question, Mr. Chairman.

Mr. ANDERSEN. I have asked that 2 or 3 times today.

Dr. MOSEMAN. I might say as far as my own personal background and training are concerned, which is in the plant-breeding and genetics field, I might be inclined to agree with you, but in looking over the contributions which have been made and those that are possible, and some of those more recent ones which have been made, I think that perhaps our soil research demands a lot more attention than we have been giving it. I think the experience that we had with the corn-production practices in the South the past 5 years point out about as effectively as possible the job that needs to be done in developing a proper combination of practices, of variety, of spacing of that variety, and fertility relationship, and all of those factors, in order to increase our crop production and to reach the levels of production we are going to have to reach by 1975.

Now, the work on cultural practices is done in this particular section on soils. We are not doing that kind of work to any extent in the Field Crops Section of our Bureau's work.

I think also that the research work relating to erosion control requires considerable strengthening.

If you look at the support for soil conservation research, as it was carried on in the Soil Conservation Service through all of these years, the funds for research in the soils field remained almost constant from 1937 until the present time.

As I recall there is about a $20,000 increase in that total appropriation, from $1,559,000 in 1937 to $1,579,000 for 1953.

There is another factor that is involved, and that is the increasing use of chemicals in agriculture. We are using herbicides, and we are using insecticides.

While we are on fairly safe ground, and have reasonable information as to what is happening, at the same time I believe we ought to be giving some attention to the impact of all of these chemicals we are dumping on soils, on crop quality.

It comes back also to the question which was raised by Mr. Marshall a while ago about raising the nutritive levels of our crops. We have to do that, in part, through our studies of soil and plant relationships.

Fertilizer use, with increasing use of nitrogen, phosphate, and potash, is bound to affect the availability of some of the other elements that go to make up our crop quality.

So, I might say, Mr. Chairman, that the more I have looked into this particular program the more I am convinced that we ought to strengthen our soils research in order to get at some of these answers.

JUSTIFICATION OF CURRENT RESEARCH PROGRAM

Mr. ANDERSEN. Doctor, you mentioned previously that the amount of money expended under soil conservation research had remained at about the same level for quite a few years. We, on this subcommittee, I think, are given to one particular failing. We question you here certain proposed increases, yet at the same time we have a tendency to forget the big bulk of your work. For instance, we have spent more time here today questioning you relating to this $100,000 increase than we have relative to the $2,696,000 which you have already received.

Dr. MOSEMAN. Yes, sir.

Mr. ANDERSEN. It is no credit, I think, to increase the crop potential in research, and on the other hand to allow farm income to remain constant through the years. Either the work should be discontinued or it has justified its existence to the point where it should be increased as time goes by. Do you not agree with me, Mr. Marshall?

Mr. MARSHALL. It would certainly appear that way.

CLOSING OUT COMPLETED RESEARCH PROJECTS

Mr. ANDERSEN. Thus the question naturally arises as to whether you perhaps have some deadwood in some of these general large items that should be discarded in favor of new work?

Dr. MOSEMAN. We have done, I believe, a fairly capable job of weeding out those less productive projects and the deadwood through the

10 years, in the process of absorbing what has been, as I pointed out past earlier, about a 25 percent reduction in research personnel.

Mr. ANDERSEN. In itself that more or less forced you to weed out such deadwood, did it not?

Dr. MOSEMAN. That is right.

Mr. ANDERSEN. Can you assure this subcommittee then, as time goes along you will carefully reexamine these old projects?

Dr. MOSEMAN. We certainly will do that, and we are making a conscientious effort not to come up for an increase unless we have no opportunity to make adjustments in our program to do those particular jobs.

Mr. ANDERSEN. You realize that this subcommittee is not able, in the small time given to it, to question into each particular line of work. We have to depend upon you people, and I think that we do have grounds for feeling that your Bureau has done a good job. But I do think that we must be on guard constantly to weed out this deadwood. Do you not think so, Mr. Horan?

Mr. HORAN. Yes; very definitely. We have, on occasion asked for a list of projects terminated or in abeyance.

Dr. MOSEMAN. Yes.

Mr. HORAN. I think it is a field where we have agreed that the work should continue.

I would like to ask a question here, Mr. Chairman.

Mr. ANDERSEN. Go ahead, Mr. Horan.

USE OF SOIL AMENDMENTS

Mr. HORAN. Referring to this work involving the effect of various chemicals and minerals on soils that, through their natural state, or through overcropping, have become deficient in certain materials, what are the latest reports on that? We know that we have one very promising chemical which is put out by one of the chemical companies, called Krilium. What are some of the newer developments?

Dr. PARKER. Krilium and similar materials are not fertilizers. they do not carry any nutrients for the soil.

Mr. HORAN. But they unlock what is there in the soil.

Dr. PARKER. They simply stabilize the physical structure of the soil. If they are properly used they will assure good physical conditions in the soil.

Mr. HORAN. There are other elements that have to be added, copper, zinc, and boron. What are some of the other materials that we have to add?

MINOR ELEMENTS IN SOILS

Dr. PARKER. There is copper, zinc, boron, and even molybdenum.

In the case of zinc in California and the Northwest, I have recently seen a statement by one of the California people that indicates that next to nitrogen, zinc is probably the most important element in their territory. That is quite a striking statement, but these elements are associated with the enzymes in the plant as well as in the animal body. They are not required in large amounts but they are involved in the vital enzymatic function of the plants.

As a matter of fact, some of our people at Beltsville feel that you can diagnose for a deficiency in copper or iron more readily by determining the level of certain enzymes contained in the plant rather than by an analysis for the mineral elements themselves.

Mr. HORAN. By iron do you mean a deficiency that is reflected in the soil that may produce goiter, and so forth?

Dr. PARKER. No; goiter is produced from a lack of iodine.

Mr. HORAN. Is that part of the soil content, and what is its significance?

Dr. PARKER. It is part of the soil content; but whether or not iodine is essential for animal growth, it is not essential for plant growth. In soil studies relatively little attention has been given to it. The Public Health people have concerned themselves with whether or not iodine is present, and, of course, iodine deficiencies are taken care of by salt.

An analogous situation is cobalt. That is a constituent of vitamin B–12, but as far as we know it has not been demonstrated as being essential for plant growth. Probably most of the animal deficiencies of cobalt are taken care of by additions to the feeds.

Mr. HORAN. That is in the field in which you hope to make progress?

Dr. PARKER. That is right, sir.

SOIL MAPS

Mr. HORAN. You also have projected the possibility of preparing soil maps.

Dr. PARKER. The work of the soil survey, which was formerly in our Bureau, was transferred to the Soil Conservation Service.

Mr. HORAN. Do you anticipate in the future having a map of the United States which might, among other things, indicate those areas which are deficient and what their deficiencies might be?

Dr. PARKER. We have such maps of a rather general nature which were prepared a few years ago.

Mr. HORAN. I have seen some of them.

Dr. PARKER. We are constantly trying to improve our knowledge to revise those.

Mr. HORAN. It is a field where, if we meet the challenge in the future as we see it, such a map definitely could have value.

Mr. ANDERSEN. I agree with you, Mr. Horan.

Mr. HORAN. That is all.

Mr. ANDERSEN. Dr. Moseman, to complete item 4, will you place the answers to the following question in the record at this point?

NUMBER OF POSITIONS UNDER INCREASE AND DUTIES

How many new employees do you propose with the increase of $100,000 requested, and just what will be their duties?

(The information requested is as follows:)

Personnel to be employed under increase of $100,000 under soils, fertilizers, and irrigation agriculture investigations for investigations on the influence of soils, fertilizers, and management practices on the nutritional value of plants

The 19 new positions required for expanding this research conducted by the Plant, Soil, and Nutrition Laboratory would be distributed by geographic locations as follows:

	Number of positions	Amount of increase
1. Ithaca, N. Y.	15	$70,000
Field of research: The increased production of food needed for our rapidly expanding population necessitates the utilization of low-fertility lands and intensified fertilization and crop production practices on all lands. The utilization of new land areas low in fertility is revealing serious nutritional problems that are related to the exhaustion or inherent lack of mineral nutrients, particularly minor trace elements, such as cobalt, copper, boron, or other minor elements deficient. Research is needed to develop methods for the amendment of soils to make them suitable for the production of plants with satisfactory nutritive values.		
Many of the normally productive lands, which are pushed to higher production under intensive fertilization and other practices, are producing crops which show mineral deficiencies. Mineral elements may be present in the soil, but not readily enough available to the plants to be absorbed in the quantities which will provide adequate nutritive values. Increased yields from improved crop varieties may also be at the expense of nutritive value. For example, the ¾ billion bushel increase in annual crop production resulting from hybrid corn has been accompanied by a 10-percent reduction in protein content. Greater productivity should not be at the expense of quality.		
Plan of work: Soil areas known to produce food or feed crops nutritionally inadequate with respect to cobalt, copper, manganese, magnesium, or iron, or containing toxic quantities of selenium, molybdenum, or other harmful constituents would be selected for crop production and feeding tests. Small animals, such as rabbits or rats, would be used in the tests to determine rate of growth, breeding behavior, lactation, viability, and specific pathologic developments. The mineral metabolism of plants would be studied to learn factors affecting the utilization by plants of minerals present in the soil. The results would be coordinated with data obtained by other cooperators, including the Bureau of Animal Industry and the Bureau of Dairy Industry, which would use large animals, and the Bureau of Human Nutrition and Home Economics which would analyze the quality of the foods for human nutrition.		
New personnel to carry out above work: 1 animal nutritionist, GS–13, and 1 scientific aide, GS–4, would have major responsibility for the animal-nutrition studies; 2 biochemists, GS–9; 1 physiologist, GS–9; 1 chemist, GS–5, and 1 scientific aide, GS–3, would conduct studies to determine amount, quantity, and effect of inorganic and organic constituents in plants, and the utilization of these constituents by animals; 4 soil scientists, GS–9, and 2 scientific aides, GS–3, would make soil analyses to determine "total" and "available" content of mineral elements and develop recommendations for additions of minor elements for corrective purposes. 2 clerk-stenographers, GS–3, would be added to do the increased typing and clerical duties relating to the proposed research program increase.		
2. Beltsville, Md.	4	30,000
The proposed staff would be concerned with the analysis and characterization of soils from which plant materials are derived and the influence of fertilizers and other treatments on soils. This phase of the work can be performed better at Beltsville, Md., where there would be close relationship with the soil-plant biochemical laboratory and with the Central Soil Survey Laboratory of the Soil Conservation Service. This research work would require 1 soil scientist, GS–9; 1 chemist, GS–5; and 1 scientific aide, GS–4. 1 clerk-stenographer, GS–3, would be required to do the typing and clerical duties relating to the program increase.		
Total	19	100,000

Mr. ANDERSEN. Now, Mr. Marshall, do you have any questions on this particular item?

Mr. MARSHALL. Yes; I do have, Mr. Chairman, some questions of a general nature.

TREND IN MAINTENANCE OF SOIL FERTILITY

Dr. Moseman, would you say that the natural fertility of our farmland is going up, is going down, or holding its own, as compared to the way it was 40 or 50 years ago?

Dr. MOSEMAN. Well, I believe that again varies with different cropping areas.

Our soil scientists call attention to the fact that many of our current productive croplands are actually in better condition for producing crops, in areas where they have been managed properly, than they were in their native state. But that is not true, as Dr. Parker has pointed out, in certain sections like in the Middle West. There has been a continuous decline in the organic matter and the fertility status of the soils out there. Dr. Parker may have something further to add to that.

Dr. PARKER. Well, the improvement has taken place, Mr. Marshall, primarily along the Atlantic seaboard and in the Southeast, where soils were initially relatively unproductive. Now many well-managed soils are far more productive than they were previously.

There has been serious deterioration in the Corn Belt, but the greatest deterioration has been in the Great Plains.

Mr. ANDERSEN. But, Doctor, relative to that, both Mr. Marshall and I have farmed for years in our own State. I can say that my farm is more productive today than it was when my father first acquired it in 1901. What do you say as to your farm, Mr. Marshall?

Mr. MARSHALL. I think as far as a comparison is concerned, in reviewing just offhand what has taken place in our neighborhood, that there are farms there that are of considerably higher fertility when properly farmed, but there are also farms in the community where the farmers have taken out of the soil a lot of the elements without any regard to putting anything back. So, you get farms which are adjoining one another, farms that have been farmed differently, and consequently there is a problem in attempting to maintain fertility.

Mr. ANDERSEN. I think, Mr. Marshall, that Dr. Parker's answer is probably correct, generally speaking in our area, but there are a lot of farms up there that are better today than they ever were before.

Mr. MARSHALL. I was asking my question from a general standpoint, but that leads me to wonder how much we need to do in getting farmers to develop these practices that will maintain the fertility of their soil. Do you feel that more ought to be done?

NECESSITY FOR MAINTAINING SOIL FERTILITY

Dr. PARKER. Yes, sir; I think undoubtedly that one of the major problems facing American agriculture over a long period of time is the maintenance of the soil productivity.

Mr. MARSHALL. Would you feel that it would be dangerous to the security and welfare of this country if that is not done, Dr. Parker? How dangerous is it, in other words?

Dr. PARKER. I feel confident that we are going to do it. If we ever start getting hungry, we will work at it a little harder. It has not been as pressing a problem to us as it has been in western Europe, for example; and in western Europe they are working at it more intensively than before the war. In Great Britain their efforts on soil management, soil amendments, the utilization of fertilizers and related research, are at a much higher level than in the United States. We will step ours up as things press on us a little bit harder.

TOTAL REQUIREMENTS FOR SOILS-RESEARCH PROGRAM

Mr. MARSHALL. Undoubtedly that is true. Can you furnish for the record estimates that would show the major cost requirement for carrying on such practices as the use of lime, phosphates, and plowing under green manure and those types of measures which would be desirable to maintain the fertility of our soil, or even increase it?

Dr. PARKER. If you so desire, Mr. Marshall, we will make an estimate of the research requirements in this field on a national basis.

(The estimate requested is as follows:)

In 1951 the total expenditures for soil research in the United States approximated $9,000,000, including $3,700,000 by the Federal Government and $5,300,000 by the States. The Agricultural Research Administration has developed estimates, in cooperation with State agricultural experiment stations, that an additional $10,800,000 would be needed for soils investigations by 1960. $4,700,000 of the increase would be needed by Federal research agencies and $6,100,000 by State agencies. These estimates do not include funds required for research on nonagricultural land.

The National Reclamation Association, in cooperation with the State agricultural experiment stations and Federal agencies, prepared an estimate of soil- and water-research requirements for the 17 Western States. These estimates are given in a report entitled "Soil and Water Problems of the West" (S. Doc. 98, 82d Cong., 2d sess.). The report indicates that $8,200,000 would be required annually and that $7,020,000 of nonrecurring funds would be required in the initial years of the program. These estimates include funds for soil and water research on forest and grazing lands, as well as on cultivated land.

There is no similar detailed analysis for the research needs of the humid or eastern agricultural areas; but, based on the recommendations of the National Reclamation Association, the estimates provided by the Agricultural Research Administration would appear to be reasonable and conservative.

VALUE OF MAJOR SOIL CONSERVATION PRACTICES IN TERMS OF INCREASED YIELD

Mr. MARSHALL. Dr. Parker, could you supply for the record the best estimate available to you, showing the value of major soil-conservation practices in terms of increased yields. I have particularly in mind the use of lime, phosphates, and those types of practices, and the plowing under of green crops. Do you have figures available to show what that increase would be?

Dr. PARKER. Yes; we could develop some very good figures, on fertilizer and lime particularly, and we would be glad to do that.

(The information requested follows:)

The use of fertilizers and lime probably accounts for about 25 percent of our current crop production. These materials, of course, are most effective when used in combination with other good soil and crop-management practices. Their efficiency probably can be increased substantially by using improved varieties, better tillage and water conservation practices.

A detailed study of fertilizer practices, in 1950, indicated that under good management an increase of 50 percent in the plant nutrients (nitrogen, phosphoric acid, and potash) applied to the soil in the form of a well-balanced fertilizer might have produced the following increases in crop yields in 1950: 85 million bushels of corn, 22 million bushels of wheat, 483 million pounds of seed cotton, 1 million tons of hay, 25 million bushels of potatoes, and 58 million pounds of tobacco.

It was also estimated from the results of this study that an increase of 50 percent in the lime used in 1950 would have provided the following potential increases: 6 million tons of hay and 4 million tons of pasture and cover crops.

The use of fertilizers and lime will provide one of the most effective ways of increasing crop production. The choice of fertilizer and its proper use, in combination with other soil and crop management practices, presents many problems that remain to be solved. We may be confident, however, that as need for higher crop production develops, these materials will be more extensively used.

RELATION OF FARM INCOME TO ADOPTION OF IMPROVED VARIETIES AND IMPROVED PRACTICES

Mr. MARSHALL. I have asked some of the other people who have been before us, Dr. Moseman, concerning a problem that is fundamental with all research. That is the dependence upon income of farmers to put these practices into effect.

Dr. MOSEMAN. Yes, sir.

Mr. MARSHALL. Can you submit a statement for the record showing what effect income has in connection with the ability of the farmers to put into effect the practices of improved varieties and improved methods of farming.

Dr. MOSEMAN. I am sure we can do that.

(The information requested follows:)

RELATION OF FARM INCOME TO ADOPTION BY FARMERS OF IMPROVED VARIETIES AND OTHER RESEARCH DEVELOPMENTS

The effect of income on the ability of farmers to adopt improved varieties and improved farming practices will vary with the nature of the specific improvement.

IMPROVED VARIETIES

There was relatively slow acceptance of hybrid corn 20 years ago, when farm income was low, and farmers faced the alternative of selecting their own seed from their cribs, when corn on the market was valued at 10 to 20 cents per bushel, or purchasing hybrid corn seed at $8 to $10 per bushel. The benefits from hybrid corn and from other improved crop varieties released in the 1930's have led farmers today not only to adopt new varieties promptly but to press experiment stations and research agencies for constant greater improvements in crops.

The ready acceptance of new strains of crops is indicated by the increase in acreage of the wheat varieties Elgin and Alicel in the Pacific Northwest, from about 5 percent in 1943 to 70 percent of the acreage to which they were suited, by 1949. Similarly, the new hard red winter wheat varieties, including Comanche, Pawnee, Wichita, and Wester, released in about 1944, had taken over 60 percent of the acreage for which they were suited, by 1949. The Stewart and Carleton durum wheats expanded from about 5 percent of the acreage in 1945 to 55 percent by 1949, in the durum areas of the Dakotas. The new sugarcane variety C. P. 44/101, released in 1949, occupied 10 percent of the acreage in Louisiana in 1952 and is expected to be the leading variety in the State by 1954. The Kennebec potato, which is resistant to late blight, has increased from a small supply of 200 bushels of certified seed in 1948 to 1,886,000 bushels in 1951.

It is recognized that this rapid acceptance of improved varieties of several crops occurred during periods of high farm income. It is probable, however, that farmers have grown to recognize the value of disease-resistant or otherwise improved crop varieties and will continue to utilize them promptly regardless of the level of farm income.

SEED COSTS

The cost of good seed has been reduced materially in recent years, and it is now possible for farmers to buy and grow certified seed of superior varieties at very little cost over the price of common seedstocks. This spring, in Montgomery County, Md., certified seed of Ranger alfalfa was available at about 53 cents per pound as compared with approximately 50 cents per pound for common northern grown alfalfa seed, which would generally be suited for growing in the same area. Seed of southern common alfalfa, which is considered less well adapted than Ranger and the northern common, was available for about 45 cents per pound. Seed of the new variety Williamsburg, which was bred and selected particularly for the area including Maryland and Virginia, and which is in short supply, was priced at about 83 cents per pound. The seed supply of Williamsburg was completely exhausted and one dealer advised that he could have sold much more at that price had it been available. This may not be clearly indicative of farmer interest under extremely low-income conditions, but it demonstrates that the cost of improved seedstocks is not necessarily a limiting factor and farmers appear to be convinced of the value of the added investment in superior seed.

CULTURAL PRACTICES

The adoption of cultural practices is somewhat more difficult to evaluate but the experience with the new methods of growing corn in the South, combining adapted hybrids with closer spacing and heavier fertilization, which has spread rapidly and widely throughout the Southern States in recent years, indicates the tendency on the part of farmers to put into practice those improvements which have been proved superior.

FERTILIZER USE

It is well established that farmer expenditures for fertilizer are closely correlated with farm income. During the period 1910–50 the annual expenditure for fertilizer in the United States has been about 5.5 cents out of each dollar of farm income from crops and Government payments. The lowest average was 3.8 cents for 1921 and the highest was 6.8 for 1951. During recent years the average rate of expenditure has steadily increased. The level of expenditure in different States varies widely. It is high in the Southeast, moderate in New England and the Midwest, and low in the Great Plains.

PEST CONTROL CHEMICALS

It is possible that lower income might result in some decreased use of pest control chemicals, including fungicides and insecticides. This would represent the inclination of an individual to assume a greater margin of risk from damage to his crop rather than pay for the insurance that investment in fungicides or insecticides might provide. This would undoubtedly depend upon the degree of potential danger to the crop.

LABOR COST AND AVAILABILITY

In some instances the availability and relative cost of labor will have an important role in determining the application of a new research practice. Cotton farmers, who in 1952 had to replant a sizable portion of the 300,000 acres sprayed with herbicides for weed control, indicated that even though they recognized the possible damaging effect of the herbicides, which undoubtedly required some of the replanting, they would again use herbicides on the crop they were replanting. It was their only alternative since labor for hand hoeing was not available and it was a choice between using herbicides or facing certain loss of their crop from weeds.

The greatest reluctance to adoption of new practices can be expected in those fields where there is some uncertainty regarding the economic benefit from the new practice. As pointed out in the National Planning Association pamphlet No. 79 entitled "How Farm People Learn New Methods," released in October 1952, annual farm output of food and fiber increased by 75 percent in recent years as compared with the years around 1910. This increased output was achieved with a total estimated input of productive resources into farming of about only 20 percent over the corresponding 1910 period. This relationship between investment and return may be a principal factor in determining the extent to which new practices will be adopted. It is the job of research in agriculture to develop practices that will make for greater efficiency and provide maximum return for minimum input of labor, machines, and materials. If research continues to progress along these lines, there should be no difficulty in achieving farmer acceptance of better practices.

AUTHORITY FOR PROGRAMS OF THE BUREAU

PROGRESS IN RESEARCH

Mr. ANDERSEN. We will go into item 5, which has to do with agricultural engineering investigations.

Dr. Moseman, will you give us a short statement as to what progress you have made during the past year or two on agricultural engineering research?

Dr. MOSEMAN. Yes; we have been giving considerable attention, Mr. Chairman, to research in farm machinery to improve the mechanization of certain crops, including cotton. We have given attention to the problem of improving equipment for applying pest-control

chemicals, including herbicides, and for other weed-control measures. Some of that work is headquartered at Stoneville, Miss., and also at Columbia, Mo., and St. Paul, Minn.

The research in the farm-structures field has been devoted to a number of projects, including the drying and storage of grains. We have given increased attention to the grain storage and drying problems in the Southeast. We are concentrating our efforts on the development of basic information as to how moisture moves in grain and how rapidly air can be forced through grains and seeds of different kinds, in order to aid in the design of proper mechanical driers.

USE OF LIGHT TRAPS TO CONTROL INSECTS

In the farm electrification field, I think one of the highlights of our program this year has been the research we have done with the Bureau of Entomology and Plant Quarantine in the control of the pink bollworm. We have used different kinds of lights and light traps and we find that we can attract large numbers of bollworm moths by this trap. We are not sure whether this will provide for an effective control, but it has been extremely useful to the entomologist in determining the extent of infestation or the spread of the insect, and in timing control operations.

Mr. HORAN. It is good only for the moth, is it not?

Dr. MOSEMAN. That is right, Mr. Horan, we are not too optimistic about their use as a control, although there are some people who feel it may be possible——

Mr. HORAN. In the fruit industry we have tried everything that came down the pike and among those were all kinds of electrical exterminators, moth pots, and these lights. But as you say, it is little more than an indicator of the density of the infestation.

Dr. MOSEMAN. That is right. So far, we have not developed it to the extent that it might be an effective control and I am not sure whether they ever would be practicable, although they may be in certain crops, such as tobacco where you have small acreages.

Mr. HORAN. You thought enough of it to put it in your justifications. Could I ask Dr. Cullinan if there has been any effective improvement in this type of pest control?

Dr. CULLINAN. No, not on the use of electrical traps for controlling fruit insects. Some of these insects are apparently not attracted by lights and yet others seem to be.

Mr. ANDERSEN. Would it not be effective on the corn borer?

Dr. CULLINAN. It seems to be; it is attracted more to it. It has not been as effective against oriental peach moth or the coddling moth and a number of these other fruit insects.

Mr. HORAN. It would be a happy solution if it would work.

Dr. CULLINAN. Yes, sir, it would.

USE OF GAS IN CURING SHADE GROWN TOBACCO

Dr. MOSEMAN. Another area of work in farm electrification has been the development of a new kind of gas burner for controlling this "house burn" problem of tobacco in the Connecticut Valley. This has meant quite a significant savings to the people in that area, of about $15 per acre in fuel cost. As you know, the "house burn" or

"pole sweat" problem is caused by the humid conditions that may occur in tobacco barns after harvesting. They formerly used charcoal burners in that area. In the last 2 or 3 years, our engineers, working with the people of the Connecticut Experiment Station and their tobacco branch experiment station, have developed gas burners that have been very effective in cutting down that "pole sweat" problem.

FERTILIZER PLACEMENT STUDIES

We have been working on fertilizer-placement studies, concentrating our efforts in the past year on the placement of the fertilizers to help establish stands of grasses and legumes, this is a rather critical problem, particularly in the Southeastern States where farmers have had difficulty in getting stands established and where they have had to reseed 2 or 3 times in many cases in order to establish pastures.

COTTON GINNING INVESTIGATIONS

The work in cotton ginning has been proceeding, both at the Stoneville Laboratory and other stations in developing improved methods for cleaning and ginning cotton. This, as you know, is a problem that has been aggravated by the increased use of mechanical harvesters. I believe there were about 19,000 spindle pickers and about 11,000 cotton strippers in the field this past year, and ordinarily, the grade of cotton has been about one grade lower from machine-picked cotton than it has from hand-picked. Through our ginning research we have been able to reduce this differential considerably. We are giving attention, in ginning research in the irrigated areas, to the same type of problems with mechanically harvested cotton, and with the buildup of static electricity through the drier conditions out there.

We are cooperating with the ginning-equipment manufactures and the Oklahoma experiment station at Chickasha, Okla., in helping to adapt the improvements that we make at Stoneville, Miss., and in the Western Laboratory at Mesilla Park, N. Mex., to the conditions for the short-staple cotton in the Oklahoma-Texas area.

Mr. ANDERSEN. Doctor, those are the major fields in which the bulk of the money given you this past year has been used; is that correct?

Dr. MOSEMAN. Yes, sir. Those are some of the high-lights of our engineering-research program.

BUDGET REQUESTS FOR MECHANIZATION STUDIES UNDER OTHER APPROPRIATIONS

Mr. ANDERSEN. I note from the justifications that an increase of $59,667 is requested under the Agricultural Marketing Act appropriation for studies on mechanization of farming operations, especially harvesting operations. Also an increase is included under the "Office of Experiment Stations" for research on mechanization of farm production to meet the decreasing farm-labor situation.

It appears to me that we are being asked to appropriate for practically the same work in at least three different places. Do you have any comment on that?

Dr. MOSEMAN. Well, I believe, Mr. Chairman, that that is one of the basic problems that we face. With appropriations directly to a Bureau such as ours, and also to the Office of Experiment Stations for grants to the States, the answer to it, at least in part, depends upon the steps that folks in my position will take in trying to develop our programs in cooperation with the State experiment stations in those fields where we have funds and the States have funds, and to try to make the most effective use of them through cooperative and coordinated effort. We are doing that in every case that we possibly can.

NUMBER OF POSITIONS UNDER INCREASE FOR IMPROVING GRASSSEED HARVESTING EQUIPMENT AND THEIR DUTIES

Mr. ANDERSEN. You are requesting an increase here of $40,072 for what appears to be a similar line of work. Would you place in the record at this point the additional personnel contemplated in conjunction with this increase and just what their function will be.

Dr. MOSEMAN. All right.

(The information requested is as follows:)

Personnel to be employed under increase of $40,072 under agricultural engineering investigations for research on the improvement of equipment for harvesting and cleaning small-seeded grass and legumeseed crops

The seven new positions required for conducting this research would be distributed by geographic locations as follows:

	Number of positions	Amount of increase
1. Corvallis, Oreg.	5	$30,000
Two agricultural engineers, 1 GS-9 and 1 GS-7, assisted by 1 general mechanic, CPC-6 and 1 general mechanic helper, CPC-4 would conduct research on the improvement of equipment for the harvesting, cleaning, and handling of grass and small-seeded legumeseed crops and on more effective methods of using such equipment. One clerical assistant, GS-3, would be required to handle dictation, typing, filing, and other clerical work.		
2. Clemson, S. C.	2	10,072
One agricultural engineer, GS-7 and 1 general mechanic helper, CPC-4 would assist the present project leader with the research on the improvement of various units of equipment for harvesting, cleaning, and handling those grass and small-seeded legumeseed crops extensively grown in the Southeast, also with research to improve the methods of using such equipment.		
Total	7	40,072

NEED FOR CURRENT AGRICULTURAL ENGINEERING RESEARCH PROGRAMS

Mr. ANDERSEN. Now, referring to the research work under this specific heading, carried on with the $1,189,000 that you have had available this fiscal year, do you consider those lines of work more important than the ones for which you are requesting an increase?

Dr. MOSEMAN. Yes; we do, Mr. Chairman.

Mr. ANDERSEN. In other words, you would not want to abandon any of the existing projects to make way for the new work?

PROGRAM CHANGES MADE TO MEET NEW PROBLEMS

Dr. MOSEMAN. We have made a number of shifts in our agricultural engineering program. I mentioned a moment ago the shifts that we made in our grain-storage work, where we closed out 1 of the 3

locations in the Middle West. We had grain-storage work going on in cooperation with the Iowa, Indiana, and Illinois Experiment Station and we closed out our work with the Illinois station to shift the funds to work in the Southeast, where the increased grain production has created problems of storage. Also, we have shifted funds from our rice-drying and storage program in Texas over to the Southeastern area for grain storage. We closed out the work at Fort Collins on sugarbeet harvesting equipment in order to strengthen some of the work that we knew needed to be done on weed-control equipment. In our engineering program, we have made quite a number of shifts of that kind.

CONSIDERABLE VOLUME OF NEW RESEARCH RECENTLY UNDERTAKEN

The other thing which I might point out is that there has been a rather constant demand for new research in this field, and the support for the agricultural engineering research has been increased through the past several years. I believe that this program probably has been reviewed as thoroughly before this committee as any section or segment of our Bureau's work.

To answer your question more specifically, I believe we have done a fairly effective job of reviewing the work that is under way. It covers a rather wide variety of problems and we have made about as many shifts as we possibly can.

Mr. ANDERSEN. In considering increases, a project must be examined to determine whether or not you can cut out deadwood at the same time you are asking for an increase for additional research. I am glad to hear you indicate that you are doing so.

RESEARCH BY FARM MACHINERY MANUFACTURERS

Doctor, how many large machinery companies are there doing research work in this particular field?

Dr. MOSEMAN. I could not give you a definite answer on the number, but nearly all of the larger companies are doing their own research work in this field.

Mr. ANDERSEN. They must do so in order to develop the machines they produce, do they not?

Dr. MOSEMAN. That is true, Mr. Chairman. I believe if we would look at the record, we would have to give the major part of the credit to the machinery companies for making possible the extensive mechanization of farming operations today.

ROLE OF FEDERAL RESEARCH IN FARM MACHINERY FIELD

Mr. ANDERSEN. I know you people have developed ideas, which in turn have later been taken up by the large machinery companies and brought into production.

Dr. MOSEMAN. That is right.

Mr. ANDERSEN. I think, of course, that your proper function is to prepare the basic research and then release the findings to private industry to enable you to devote your efforts to new fields.

That brings me up to another question. Why can we not rely more on the research work done by large machinery companies so that your Bureau can act in a coordinating or supervisory position on a nation-wide basis?

Dr. MOSEMAN. I think we are trying to do just that.

The item that we have for increase this year represents, I think, a rather typical problem. Industry, as you know, has developed different types of combines and harvesters for small grains and different kinds of crops. The farmers are using those machines to harvest legume and grass seed but this is a rather specialized type of harvesting job. The industry people recognize that the farmers are buying the combines that are available to them, and it is rather difficult to get a single implement company to carry the full cost of the research work of modifying the machines to do a better job. Right now the farmer is suffering from the losses in harvesting inefficiency.

Mr. ANDERSEN. I think you are right, but it does seem that your Bureau, after producing the basic ideas, should act in a coordinating and supervisory position and encourage the large farm-machinery producers to take over where you leave off. Thus your funds could cover a far wider field than they do today?

Dr. MOSEMAN. Yes, sir.

Mr. ANDERSEN. Of course, there is a limit to the funds Congress can put up for these various lines of work, and we have to depend upon you people to see that it is spread as far as possible where it will do the most good.

COMPARISON OF RESEARCH FUNDS SPENT BY GOVERNMENT AND INDUSTRY

Mr. WHITTEN. I think, Mr. Chairman, the work this Bureau is doing is splendid. As we have studied this whole question through the years, it becomes more and more apparent that we are beginning to show signs in this country of having the problems which exist in the older countries in other parts of the world. It is a neverending job to stay ahead of diseases and pests, and the answers that you have today to many of these problems are as far ahead of the answer that you had 30 years ago, as the automobile of today is to that of 30 years ago. It stands to reason that, in many of these fields 30 years from now, if we keep making this effort, our answers will be far ahead of where we are today. Because of the rapidity with which these problems catch up with us, they will have to make considerable additional progress will they not?

Dr. MOSEMAN. That is right.

Mr. WHITTEN. I think it would be well for the record to show here the total amount we spend in research in agriculture, as compared with the amount of money spent for research throughout the Government. I also think it might be well to show, insofar as you can, the approximate amount of money that is spent by industry.

(The information requested above is as follows:)

U. S. Government expenditures for research and development [1]

[In millions of dollars]

	1940	1951	Increase	
			Amount	Percent
All Government	$73.7	$1,543.0	$1,469.3	1,994
All military	26.4	960.0	933.6	3,536
Atomic energy		325.9	325.9	
Federal Security Agency	2.8	59.9	57.1	2,039
National Advisory Committee for Aeronautics	2.2	62.5	60.3	2,741
Department of Agriculture	28.7	55.7	27.0	[2] 94
Department of Commerce	3.3	20.7	17.4	527
Department of Interior	7.9	36.4	28.5	361
All other agencies [3]	2.4	21.9	19.5	812

[1] With exception of amounts shown for Department of Agriculture, data on 1940 and 1951 expenditures were taken from tables on Government research prepared by Budget Bureau and dated July 25, 1951, and Aug. 15, 1951, which tables exclude economic research. Department of Agriculture figures represent total research expenditures, including economic research. "All Government" figures have been adjusted accordingly.

[2] During the same period, however, costs of operation of the Department's research program increased an estimated 79 percent, so that the increase in the effective level of the Department's research program was very much less than the 94 percent increase in funds would indicate.

[3] Federal Communications Commission, General Services Administration, Housing and Home Finance Agency, National Science Foundation, Reconstruction Finance Corporation, Smithsonian Institution, Tennessee Valley Authority, Veterans' Administration, Department of State, and Treasury Department.

Facts about research in industry in 1951

1. Total cost of research		$1,959,100,000
2. Proportion of industrial research cost borne by Federal Government:		
All industry	percent	47.0
Aircraft	do	85.0
Electrical machinery	do	58.5
Chemical industry	do	7.0
3. Cost of research as a percent of sales:		
All industry	do	2.0
Aircraft	do	13.0
Electrical machinery	do	6.0
Chemical industry	do	2.5
4. Cost per research worker:		
All industry		$8,900
Aircraft		$9,900
Electrical machinery		$9,800
Chemical industry		$7,900
(USDA		$5,700)

National Arboretum

Mr. Horan. You are asking for an increase for the National Arboretum.

Dr. Moseman. Yes, sir. We have an increase of $76,000.

Mr. Horan. How are you going to use that increase?

JUSTIFICATION OF PROPOSED INCREASE

Dr. Moseman. That is for the operation and the maintenance of the Arboretum, to care for the plantings that we have there now.

As you know, the Arboretum contains about 400 acres. We have developed that rather slowly over the years. A few years back this committee provided the funds to round out the tract of the Arboretum and we have made a large number of plantings there, some of them provided by our own Research Bureau, of different plant materials that we had.

We also have received a number of gift collections from different organizations—garden club groups and units of that kind. We have accepted all of those that we could, because we feel that is an economical way to build up the National Arboretum plantings. But now that we have many of those collections, we do have the job of maintaining and keeping them up. Also, we have a considerable amount of material that was grown in nursery plantings out there that has to be put into permanent place. We cannot delay that much longer, or those trees will get larger and our job of maintaining them and replanting them will become more costly in future years.

BASIC PURPOSE OF NATIONAL ARBORETUM

Mr. HORAN. What was the basic interest in starting the National Arboretum? Were you planning on something that would be a small duplication of the Kew Gardens?

Dr. MOSEMAN. That was the intent, Mr. Horan. It was established by the Congress in 1927 to provide a place for the collection of living plant materials that are adapted to this particular geographical area. We recognize that a National Arboretum, as such, cannot include all kinds of plants, because the tender southernmost varieties cannot be grown here and some of the northernmost strains cannot, but it was felt that there was need for a place in this general geographic and climatological area where we could maintain plants that were suited for this particular region.

RELATION TO BOTANIC GARDENS

Mr. HORAN. Dr. Cullinan, has anyone ever thought of centralizing the things for which we now appropriate Federal funds, such as the Botanic Gardens and that sort of thing in one arboretum?

Dr. CULLINAN. Well, I think there has been some discussion of that in the past. The Botanic Gardens are federally supported and they work more with perishable greenhouse material than with the trees and shrubs of the Arboretum. It was the feeling back when the National Arboretum was started, and consideration had been given to it by representatives of the land-grant colleges and garden clubs and the nurserymen's association, that this could be a very educational institution here in the city of Washington, not only for the people of this country, but those who came from abroad and would come to the Nation's Capital. They probably would not journey to some of the other parks and areas that we have throughout the country and they could see here northern and southern species in one central location. We are also going to maintain and are maintaining an herbarium so that students coming here from abroad, or any part of the United States, would have an opportunity to see here representatives of all the American species of plants that could be kept in the herbarium and also so that you could see the pines, and hemlocks, and all the species of trees right here in Washington.

COMPARISON WITH KEW GARDENS IN LONDON

Mr. HORAN. I have visited the Kew Gardens in London, and, of course, they are of immensely more acreage than what we have here, although, essentially, we could probably do as much in 400 acres,

if it were properly landscaped, as they have there. Of course, they have, as you know, the "cactus houses" and these botanical houses, and they have almost anything you want in that strip of at least four or five thousand acres. I have forgotten how large it is, but it dates back to the middle of the 18th century. We have the National Arboretum, and it has been with us now about 25 years, and we have from time to time made expenditures on it. We have kept it on a maintenance basis, at least, and we must either accept it, or provide for its liquidation one way or the other. If we are forced to do the latter, I imagine we will have a great deal of protest.

I think we should explore the possibility of coordinating the work that is being done right here, and, perhaps, make a savings.

PLANT MATERIALS IN NATIONAL ARBORETUM

Dr. CULLINAN. That is right. I might say in that connection that at the present time we do not envision bringing in the cactus plants that can be grown in the Southwest and to try to have everything here that is grown in the United States. We would have here certain types or species where the nurserymen could come and see the varieties in the trade and the various varieties of plants that are handled by the nurserymen, that in general can be used in the North or South, except the more tender ones.

We have at the present time a fine collection of flowering crabapples which was presented to us by the American Association of Nurserymen, and we hope to maintain and keep records on those, so that information can be made available to people who want that information. We are doing that with all of the collections. We want to make them useful; we do not want it just as a show-place.

Mr. HORAN. Have you ever visited the Ohme Gardens near Wenatchee, Wash.? That is a most interesting development and one of the outstanding gardens of the whole world. People use it incessantly. It is built in a rock area of not more than 2½ acres, and I do not think the Kew Gardens are as beautiful as Ohme out in our area.

NUMBER OF EMPLOYEES UNDER PROPOSED INCREASE

How many new employees do you plan to have with this increase?

Dr. MOSEMAN. We would have 17½ man-years of new employment.

Mr. HORAN. Is this part-time work?

Dr. MOSEMAN. No; these would be 13 full-time employees; and about 4½ man-years of casual labor.

Mr. HORAN. What are their titles, grades, and salary?

Dr. MOSEMAN. We have 2 horticulturalists of the GS–7 grade; 5 subprofessional or agricultural aid people; 1 clerical or stenographic position; and then we have the CPC, custodial type of help, with a total of 5 full-time people in that category, with an additional 4.5 man-years of casual or temporary labor.

OPENING ARBORETUM TO PUBLIC

Mr. HORAN. Is the Arboretum kept open the year-round?

Dr. MOSEMAN. No; it is not. People can always get in during the day because we have personnel on duty there at all working hours. We do have to control the people to a certain extent and we try to

limit publicity regarding the Arboretum to certain periods, such as when the azaleas are ready for showing, when we open the Arboretum for about 3 or 4 weekends in the spring of the year.

DUTIES OF PROPOSED NEW EMPLOYEES

Mr. HORAN. What will be the specific duties of those people who are on full-time employment the year-round?

Dr. MOSEMAN. These people on full-time employment will be concerned with the job of labeling the trees and maintaining the plantings there, which requires considerable technical knowledge about plant growth and handling. We hope to progress some on the labeling of the trees and keep those up-to-date so that as people come through, they can tell what the different species are.

The labor staff would be used to prepare sites for planting, where we are going to move some of the material from the nursery into the permanent sites, and also to help with the maintenance work, not only of the plant material, but also of the roads and the general grounds. The entire tract is fenced and I do not know whether you have been out there recently, but we do have a job of maintaining and painting the fence at the present time. It is starting to rust pretty badly.

PRESENT STAFF

Mr. HORAN. What is the size of the present staff?

Dr. MOSEMAN. At the present time we have 3 professional positions at the Arboretum, and 1 at the herbarium. In addition there are 7 agricultural aides, and 12 CPC employees; about 8 man-years of casual labor are employed.

Mr. HORAN. How do you assign them on a year-round basis?

Dr. MOSEMAN. Some of this is part-time labor done during the summer months in keeping the weeds down, mowing the greensward areas and that type of thing. We have a reduced staff in the winter-time, although with a winter such as the one we had just now, we can keep a fairly large staff occupied effectively in clearing out some of the brush areas, maintaining roads and that type of thing. Our herbarium collection is increasing by 20,000 specimens each year and requires constant attention.

BLACK SHANK OF TOBACCO

Mr. ANDERSEN. What developments have you made in the black shank problem?

Dr. MOSEMAN. As you know, Mr. Chairman, we received increased funds last year for work on the black shank problem.

Mr. ANDERSEN. Yes; we gave you $40,000 for that purpose last year, did we not?

Dr. MOSEMAN. Yes, sir. There was some further increase by the Senate committee and so we have a total of $77,000 of new support for that work.

Mr. ANDERSEN. What use did you make of that money?

Dr. MOSEMAN. We are working with the State experiment stations in North Carolina, in Kentucky, in Georgia, and in Tennessee in strengthening breeding programs to develop resistant varieties. We have also used a portion of the funds to strengthen our fundamental

genetics and breeding research here at Beltsville and have set up what we call a "winter breeding garden" down at Cocoa, Fla., The purpose of that is to grow two crops of tobacco during a season. The temperatures down there are mild enough so we can grow a crop during the winter months and then harvest the seed and grow a second crop in the regular tobacco producing States during the regular season. This is essentially doubling the speed of our breeding program, because we can grow two generations a year. The Bureau is furnishing the facilities down there so that the State experiment station plant breeders can send their material down there, have it grown and sent back for their own tests during the regular crop season.

The work at Beltsville is concerned pretty largely with trying to transfer disease resistance from some of the wild relatives of tobacco into the commercial types of burley, bright leaf, and the cigar tobaccos. That requires a rather specialized handling of the material in order to produce crosses and also for the selection of the kinds of tobacco that might be best suited for commercial growers; that is, for leaf quality and that sort of thing, because you would hardly recognize the wild types as tobacco. They are narrow leafed, rather nondescript plants in most cases.

RESEARCH ON HALOGETON CONTROL

Mr. ANDERSEN. Doctor, this fiscal year we gave your Bureau $40,000 to use in connection with the halogeton problem? Will you comment on that?

Dr. MOSEMAN. We are working primarily in cooperation with the Utah and Nevada Experiment Stations on that program. We are studying the ecological habits of the halogeton plant. As you know, it is a poisonous plant that infests the ranges, and since it is so widespread, it is going to be difficult to control with any spray or material of that kind. It seems that the best control might be a natural one and we are trying to determine how it grows and spreads and that type of thing.

We are working in cooperation with the Nevada Experiment Station at Reno and we have put on a physiologist at the Logan, Utah, station to work with the State people there, who have already started the program. We also are putting on some part-time students in southern Idaho, cooperating with the Idaho Experiment Station, where we employ people who work full time during the summer months and go to school during the winter period.

Mr. ANDERSEN. What are your developments relative to better control of this? There is also an appropriation to the Interior Department for control work on this.

Mr. HORAN. I am quite sure there is.

Mr. ANDERSEN. You are conducting research into the best possible uses of such control, are you not?

Dr. MOSEMAN. Yes, we are. The $2 million that was provided to the Bureau of Land Management, Mr. Chairman——

Mr. ANDERSEN. That is for control work?

Dr. MOSEMAN. Yes, sir; and that is concentrated primarily on the large program of reseeding operations in much of that area.

COORDINATION WITH CONTROL PROGRAM OF DEPARTMENT OF THE INTERIOR

Mr. ANDERSEN. Do they turn any of that over to you for research?

Dr. MOSEMAN. No, sir; they are not turning any funds over to us, but wherever we have areas that are suited for study, for research work, they cooperate with us very closely in giving us help—machinery and labor and that type of cooperation to every extent possible.

Mr. ANDERSEN. Do you know whether or not this has spread during the past year?

Dr. MOSEMAN. There has undoubtedly been some spread, Mr. Chairman, but just how significant that has been, I do not know.

Mr. HORAN. Have you developed any natural enemies to this plant?

Dr. MOSEMAN. We have not, as yet. We are giving consideration to that whole field of natural enemies for weeds, in cooperation with the Bureau of Entomology and Plant Quarantine.

RESEARCH ON CORN HYBRIDS RESISTANT TO CORN BORERS

Mr. ANDERSEN. Doctor, what are the latest developments in connection with the corn borer?

Dr. MOSEMAN. We have continued our work with the Iowa Experiment Station and with the people at Purdue in the development of resistant corn hybrids.

Mr. ANDERSEN. You are approaching it from the viewpoint of developing resistant hybrids. What are you doing in the line of direct control of the borer itself?

Dr. MOSEMAN. Our work is not on that phase of it. The entomologists have a program on that and are giving it some attention. The only phase that we are working on in that connection is our light trap work in farm electrification.

RESULTS OF LIGHT TRAPS ON CONTROLLING CORN BORER

Mr. ANDERSEN. What results have you had in the use of light traps in designated areas? I understand there is one such experiment going on not far from my home area?

Dr. MOSEMAN. Yes, sir.

Mr. ANDERSEN. What did you find out from that experiment?

Dr. MOSEMAN. We were able to catch quite a number of moths, but the difficulty is trying to evaluate the real impact of that kind of program on the total population of the moths and borers in the field.

Mr. ANDERSEN. I presume that will take a few years yet?

Dr. MOSEMAN. Yes, sir; it will, and it is a rather difficult thing to evaluate, because you cannot set aside a certain area and have it checked to see how many moths are in that area originally, and then go back and check to see how many there are after your traps have attracted quite a number of them. It is a rather difficult problem to get at.

RESEARCH ON WEED CONTROL

Mr. ANDERSEN. What are the latest developments in research on weed control?

Dr. MOSEMAN. I believe in that connection, some of the work that we have done in fundamental research at Beltsville might be of interest to this committee.

We have been studying a series of compounds out there called the carbamates. You have probably heard them referred to as IPC. We have cooperated with some of the industry people in trying to determine just what it is in the chemical compounds that makes them active. This is a chart showing the benzene ring of a carbamate derivative. If we place chlorine in the No. 3 position of this ring we get a compound that will kill germinating crabgrass. If we add to that a methyl group over here in the No. 6 position, we get a compound that will kill not only crabgrass, but also other weeds, but it does not hurt the cotton plant. So, this, I think, is one of the most interesting lines of work that we have in our whole weed-control research program.

Mr. HORAN. It has no effect on broad or thick leafed plants?

Dr. MOSEMAN. As I mentioned, this would kill the crabgrass, which is a thin-leafed plant, but over here with this combination, it will kill the broad-leafed weeds, mustard and pigweed.

Mr. ANDERSEN. Does it affect the cotton?

Dr. MOSEMAN. No, sir. We feel that this type of research is just the kind of thing we need if we are ever going to develop truly selective herbicides and actually prescribe chemicals for the control of different kinds of weeds.

WEED CONTROL IN THE MIDWEST

Mr. ANDERSEN. What have you discovered of interest in the upper Midwest as far as weed control is concerned?

Dr. MOSEMAN. Well, we have some pretty good answers there, Mr. Chairman, in the control of weeds in grain crops. The 2,4–D compounds work fairly effectively in that area and we can use several chemical compounds for control of weeds in such crops as flax, sugar beets and so on.

COORDINATION WITH WORK OF RANGE IMPROVEMENT ASSOCIATIONS

Mr. HORAN. What contacts do you have with the range improvement associations?

Dr. MOSEMAN. We do not work directly with them. Do you mean in our weed research work?

Mr. HORAN. I think this is a very hopeful program that many of our progressive communities have developed. We actually have a range improvement association going so far as to worry about some of the noxious weeds that grow along the roads, and I know of certain instances where the Department of Agriculture is doing everything it can to encourage them. But I suppose they probably would come under the plant quarantine work.

We have them out in Utah and we have them in my State. It is a somewhat new development in the present era. We used to have range associations in the old sheep and cattle days, but that was in regard to another matter.

We have the klamath weed and the Canadian thistle and other weeds which are of considerable menace and if we can get the people in local communities, by proper type of encouragement, to do something on this of their own, it would be fine, and they are anxious to cooperate. Do you know, Dr. Cullinan, about cooperation of your Bureau with the range improvement associations?

Dr. CULLINAN. Entomology and Forest Service would be more directly related with that.

INTERAGENCY WEED CONFERENCES

Dr. MOSEMAN. I think it may be pertinent to state that we do have these weed conferences. We have the Western Weed Conference, which meets periodically—I think every 2 years. That is a conference that includes the research people from the State, Federal, and also industry fields, and they meet with the State control officers. Most of the actual control work is handled through the State departments of agriculture. We do have that kind of liaison with the control people. Also, within the Federal Government we have an Interdepartmental Weed Committee, which includes representatives from our Bureau, from the Bureau of Land Management, Bureau of Indian Affairs of the Department of the Interior, the Forest Service, Bureau of Entomology and Plant Quarantine, and other agencies that may be interested in this whole program. We also have work with the Bureau of Reclamation, coordinating our research efforts with their operations on certain projects they are carrying out.

EFFECT OF HERBICIDES ON POLLINATION

Mr. MARSHALL. In the use of these weedkillers, is that having any appreciable effect on the insects that naturally pollinize certain of our crops?

Dr. MOSEMAN. I do not believe the weedkillers are, Mr. Marshall. There has been some problem in that connection with the use of the different kinds of insecticides, where DDT and some other insecticides killed beneficial insects just in about the same way they killed harmful ones.

Mr. MARSHALL. Are you having difficulty in plantwork because of a shortage of certain seeds?

Dr. MOSEMAN. No.

Mr. MARSHALL. It has not reached that extent?

Dr. MOSEMAN. We have not been troubled in that way in the use of herbicides because we are using materials that are pretty highly selective. That is, we use chemicals that will kill the unwanted plants or the weeds in crops, like small grains, sugarcane, and other economic crops, without damage to the crop itself. So, we are not faced with that same kind of disturbing of the balance of nature between damaging and beneficial species as you have with beneficial and destructive insects when you use insecticides. I think the closest we come to that problem in the use of herbicides is where we find some of these growth-regulating substances, or herbicides that may tend to modify the palatability of certain plants. If you use an herbicide in an area where you have some toxic plants or plants that would normally be poisonous to animals, but which they would leave alone because of the lack of palatability, in a few cases if you treat them with an herbicide it changes their palatability and animals may eat them. So, we have tried to control that by encouraging farmers to keep their animals off pastures after they have been treated, say, for 48 hours or so.

COOPERATION WITH TVA

Mr. HORAN. The question has been asked concerning areas such as TVA or in areas where there are power revenues and where development work is going on and you are called upon to do research in that area. Is that by direct appropriation, or are power revenues used in some instances?

Dr. MOSEMAN. I do not know that we have very much work of that kind. The closest we may come to it is the fertilizer-research work that we are doing to a certain extent in cooperation with TVA.

Mr. HORAN. That is part of this question.

Dr. PARKER. There is no transfer of funds at all.

Mr. HORAN. This research is done on direct appropriation?

Dr. PARKER. Direct appropriation. They have a research program. We have a direct appropriation for our work and we coordinate our efforts.

DRYING OF FIELD CROPS

Mr. HORAN. In the field of drying of crops, Dr. Quisenberry, how are you coming along with that?

Dr. QUISENBERRY. The drying of crops?

Mr. HORAN. Corn in a wet year or hay drying, and that sort of thing. It was one of the problems in agricultural engineering.

Dr. QUISENBERRY. As Dr. Moseman mentioned a little while ago in his statement, we are making considerable progress on the drying of farm crops using ordinary air, unheated air, and also in using heated air. It takes more time to bring moisture down in drying when you use the unheated air; but, of course, it is not so expensive as is heated air. The work has included the different types of bins, different types of facilities and blowers, the question of forcing this air through different types of grain. How much power does it take to force it through wet corn, dry corn, if it is dirty and has not been well cleaned, and so on? We think that the work in this field has made very good progress; and, of course, there are many more questions to be answered.

EXPERIMENTAL FARMHOUSES AT BELTSVILLE FOR DAIRY WORKERS

Mr. HORAN. Regarding those houses that have been built at the dairy farm at Beltsville, are they occupied now? Are they ready for inspection?

Dr. MOSEMAN. I might point out, Mr. Horan, that we do not have an agricultural-engineering representative with us today. Dr. Quisenberry is in our immediate Bureau office in the coordination of our program, bureauwide; so I will try to answer that question for you.

Mr. HORAN. It was the plan of this subcommittee to go out there this past week, but something came up and we could not make it. We are anxious to see that.

Dr. MOSEMAN. We have 3 of those houses that are completed and 2 of them are occupied. I am not sure whether the third one is occupied or not. They were going to move in during the past few days, as I recall. We have the 3 of them built and have plans for a fourth one. Some arrangements have been made with one of the large aluminum companies to donate certain aluminum materials for insulation. Other companies are providing vaporproofing material,

caulking compounds, and one of the large manufacturers of windows is providing us with a type of thermopane glass. It is not exactly the same as the expensive thermopane but it is double glass with insulating air space between. We are utilizing those types of materials to see how we can cut down on the cost of these houses and develop features in them that will be less expensive than construction that is conventional.

INFORMATION DIVISION PERSONNEL

Mr. ANDERSEN. You have 28 people in the Information Division. Just what do they do?

Dr. MOSEMAN. We have 11 of those people who are concerned with editorial work; that is, the editing of manuscripts and publications. We have three that are concerned with the answering of mail. Those three people mail out bulletins and general answers to questions that come in from all over the country. Some idea of their workload is indicated by the more than 11,000 pieces of mail that they handled over a 6 months' period from July to December of this past year. We have five people who are concerned with special reports and visual information, that is, the duplicating or mimeographing work and the photographic work for the Bureau; taking pictures of scientific developments, photographs for publications, and that type of thing.

Mr. ANDERSEN. That accounts for 19 of them. What about the other 9?

Dr. MOSEMAN. We have four working on current information, providing material for press and radio, for Farm and Home Hour broadcasts and similar news releases about our research. I do not know whether I mentioned that earlier or not.

Mr. ANDERSEN. I do not think you did.

Dr. MOSEMAN. We have the office of the head of the division, which involves the head of the division and his stenographer. Three of the positions are vacant at the present time. I do not know whether that accounts for all of them but it comes pretty close. I would like to point out in this connection that we do have a fairly sizable workload of information and editorial service in our Bureau as measured in several different ways. If we take into account the publications that are made available for congressional distribution, we have about 220 of those or roughly 39 percent of the total of the 559 published by the 12 Bureaus or Agencies of the Department, available for such congressional distribution.

MOTION PICTURE WORK LIMITED

Mr. ANDERSEN. What do you do in film and motion picture production?

Dr. MOSEMAN. We do not do very much in that field. We may take motion pictures of some machinery developments if we have a potato harvester or something like that where we want to picture the motion or action pretty well. It is specialized work of that kind.

Mr. ANDERSEN. How many economists do you have in your Bureau?

Dr. MOSEMAN. We do not have any.

ADMINISTRATIVE PERSONNEL

Mr. ANDERSEN. You have 80 people in administration now. Just why do you need that many there?

Dr. MOSEMAN. Those are the folks who handle our personnel, fiscal, accounting, and budget operations.

Mr. ANDERSEN. You have altogether about 2,037 people, do you not?

Dr. MOSEMAN. Yes; under the direct obligations for regular appropriations.

Mr. ANDERSEN. That indicates about 4 percent in administration. Is that not a little high?

Dr. MOSEMAN. No; if we would use the figures on personnel, for example, we have 15 people that are concerned with personnel work in the Bureau. That figures out, if we take all the funds that we have, regular appropriations and contributed funds from different sources, to about 1 personnel worker for each 156 employees. Now, I understand that the Bureau of the Budget has established standards that permit a ratio of personnel workers to employees of about 1 to 110. So I believe we are on the low side so far as our personnel staff is concerned. In fact, we are not carrying out some of the things that the Civil Service Commission and the Office of Personnel recommend for good management of personnel; that is, in the way of specialized training programs for our employees, we do not have a Bureau safety officer, and we have not established the type of recruitment and career development programs that have been indicated through management studies to represent a sound investment in administration.

AUTHORITY FOR PROGRAMS OF THE BUREAU

Mr. ANDERSEN. I would appreciate your placing in the record at this point a statement on your basic legal authority for each project, indicating whether each is mandatory or permissive.

Dr. MOSEMAN. Yes, sir.

(The information requested is as follows:)

STATUTORY AUTHORITIES FOR THE BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

The work of the Bureau of Plant Industry, Soils, and Agricultural Engineering, under the subappropriation "Plant, soil, and agricultural engineering research" stems from the organic act establishing the Department of Agriculture which reads in part as follows:

(5 U. S. C. sec. 511:) "There shall be at the seat of government a Department of Agriculture, the general design and duties of which shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture, in the most general and comprehensive sense of that word and to procure, propagate, and distribute among the people new and valuable seeds and plants." (Act May 15, 1862, ch. 72, 2, 12 Stat. 387.)

(5 U. S. C. sec. 514:) "The Secretary of Agriculture shall procure and preserve all information concerning agriculture which he can obtain by means of books and correspondence, and by practical and scientific experiments, accurate records of which experiments shall be kept in his office * * * and by any other appropriate means within his power; he shall collect new and valuable seeds and plants; shall test, by cultivation, the value of such of them as may require such tests; shall propagate such as may be worthy of propagation; and shall distribute them among agriculturists." (Act May 15, 1862, ch. 72, 3, 12 Stat. 387.)

The Bureau of Plant Industry was established June 3, 1902, under legislation enacted as follows:

(5 U. S. C. sec. 524:) "All statutes existing June 3, 1902, relating to * * * the Division of Botany, the Division of Pomology, the Division of Vegetable

Physiology and Pathology, the Division of Agrostology, and Experimental Gardens and Grounds, reorganized into the Bureau of Plant Industry, not otherwise repealed, shall remain in effect as applying to the respective bureaus into which the Divisions named have been rereorganized." (Act June 3, 1902, ch. 985, 32 Stat 303.)

The work under these authorities has been continued and added to under appropriation acts which provided further legislation, mostly on an annual basis. Certain legislation affecting the whole Department is applicable also to the Bureau of Plant Industry, Soils, and Agricultural Engineering. For example, funds appropriated under the Special Research Fund and Research and Marketing Act of June 29, 1935, as amended by Research and Marketing Act of 1946 (7 U. S. C. 427–429d, 427h–427j, 1621–1629) have been transferred to this Bureau and work is conducted under its authority.

Soil fertility and soil microbiology work was transferred from Bureau of Chemistry and Soils to Bureau of Plant Industry by act May 17, 1935 (ch. 131, 49 Stat. 258).

Pursuant to Executive Order 9069, dated February 23, 1942, and in conformity with Secretary's Memoranda No. 960 and No. 986 and Agricultural Research Administrator's Memorandum No. 5, approved by the Secretary on February 13, 1943, the agricultural engineering divisions of the Bureau of Agricultural Chemistry and Engineering (except work on the construction of a cotton cutting machine supported by a supplemental appropriation for fiscal 1943, Publication 763), and also Effluent Contaniments and Chemical Weed Eradication Section of the Division of Agricultural Chemical Research of that Bureau, were transferred to the Bureau of Plant Industry, which thereafter was designated the Bureau of Plant Industry, Soils, and Agricultural Engineering.

Reorganization Plan No. 1 of 1947, part III, paragraph 301, transferred the functions of the Bureau of Plant Industry, Soils, and Agricultural Engineering "to the Secretary of Agriculture and shall be performed by the Secretary or, subject to his direction and control, by such officers and agencies of the Department of Agriculture as he may designate."

All research in soil and crop management, and in water management on farms related to crop production previously conducted in the Soil Conservation Service was transferred effective November 15, 1952 to the Bureau of Plant Industry, Soils, and Agricultural Engineering by Secretary of Agriculture Memorandum No. 1318 dated October 14, 1952.

The Bureau's authority for the operation and maintenance of the National Arboretum is contained in mandatory legislation which reads in part as follows:

20 United States Code 191: "The Secretary of Agriculture is authorized and directed to establish and maintain a national arboretum for purposes of research and education concerning tree and plant life * * *" (act of Mar. 4, 1927, ch. 505, par. 1, 44 Stat. 1422).

20 United States Code 193: "In order to stimulate research and discovery the National Arboretum established by the Secretary of Agriculture in accordance with the provisions of sections 191–194 of this title shall be under competent scientific direction. The Arboretum shall be administered by the Secretary of Agriculture separately from the agricultural, horticultural, and forestry stations of the Department of Agriculture, but it shall be so correlated with them as to bring about the most effective utilization of its facilities and discoveries" (March 4, 1927, ch. 505, par. 3, 44 Stat. 1422).

Mr. ANDERSEN. Are there any further questions?

Thank you, Doctor. We have enjoyed our discussion with you today.

WEDNESDAY, MARCH 18, 1953.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

WITNESSES

DR. M. R. CLARKSON, DEPUTY RESEARCH ADMINISTRATOR, ARA
A. S. HOYT, CHIEF, BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
DR. F. C. BISHOPP, ASSISTANT CHIEF, B. E. AND P. Q.
DR. W. L. POPHAM, ASSISTANT CHIEF, B. E. AND P. Q.
HENRY G. HERRELL, DEPUTY ASSISTANT CHIEF (ADMINISTRATION), B. E. AND P. Q.
MRS. M. W. SYFRIG, BUDGET OFFICER, B. E. AND P. Q.
RALPH S. ROBERTS, DIRECTOR OF FINANCE AND BUDGET OFFICER, UNITED STATES DEPARTMENT OF AGRICULTURE

SALARIES AND EXPENSES

Amounts available for obligation

	1952 actual	1953 estimate	1954 estimate
Appropriation or estimate	$11,606,000	$12,167,368	$12,590,000
Transferred to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," animal research, pursuant to 5 U. S. C. 568b	−8,000		
Adjusted appropriation or estimate	11,598,000	12,167,368	12,590,000
Reimbursements from non-Federal sources	57,751	75,832	81,000
Reimbursements from other accounts	20,823		
Total available for obligation	11,676,574	12,243,200	12,671,000
Unobligated balance, estimated savings	−284,394		
Obligations incurred	11,392,180	12,243,200	12,671,000
Comparative transfer from—			
"Control of emergency outbreaks of insects and plant diseases, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration"	785,778		
"Salaries and expenses, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration," plant, soil, and agricultural engineering research		5,000	
"Salaries and expenses, Office of Administrator, Agricultural Research Administration"	17,210	15,800	
Total obligations	12,195,168	12,264,000	12,671,000

NOTE.—Reimbursements from non-Federal sources above are from payments by non-Federal agencies for services of plant quarantine inspectors performed outside regular hours of duty (7 U. S. C. 576); and from proceeds of sale of personal property (40 U. S. C. 481 (c)).

Obligations by activities

Description	1952 actual	1953 estimate	1954 estimate
Direct Obligations			
1. Insect investigations:			
(*a*) Insects affecting food, feed, and fiber crops	$2,714,973	$2,763,260	$2,991,500
(*b*) Insects affecting forests and forest products	462,412	465,600	465,600
(*c*) Insects affecting man and animals	235,224	239,400	239,400
(*d*) Plant pest control investigations	411,397	493,500	493,500
Subtotal	3,824,006	3,961,760	4,190,000
2. Insect and plant disease control:			
(*a*) Japanese beetle control	500,947	475,800	482,700
(*b*) Sweetpotato weevil control	238,069	234,600	238,000
(*c*) Citrus blackfly and Mexican fruitfly control	256,020	223,200	226,500
(*d*) Phony peach and peach mosaic eradication	158,834	153,900	156,100
(*e*) Barberry eradication	674,224	648,600	658,000
(*f*) Pink bollworm and Thurberia weevil control	1,237,252	1,197,500	1,214,900
(*g*) Golden nematode control	311,897	340,000	344,900
(*h*) White-fringed beetle control	703,740	672,600	682,400
(*i*) Hall scale eradication	108,245	117,200	117,200
(*j*) Gypsy and brown-tail moth control	584,948	519,000	526,600
(*k*) Grasshopper and Mormon cricket control	549,627	558,008	566,700
(*l*) Insect detection and advisory service	236,151	386,000	386,000
Subtotal	5,559,954	5,526,408	5,600,000
3. Plant quarantines	2,732,634	2,700,000	2,800,000
4. Obligations under reimbursements from non-Federal sources	57,751	75,832	81,000
Total direct obligations	12,174,345	12,264,000	12,671,000
Obligations Payable Out of Reimbursements From Other Accounts			
1. Insect investigations:			
(*a*) Insects affecting food, feed, and fiber crops	8,472	----------	----------
(*b*) Insects affecting forests and forest products	2,642	----------	----------
(*c*) Insects affecting man and animals	58	----------	----------
(*d*) Plant pest control investigations	1,039	----------	----------
Subtotal	12,211	----------	----------
2. Insect and plant disease control:			
(*i*) Hall scale eradication	2,157	----------	----------
(*j*) Gypsy and brown-tail moth control	605	----------	----------
(*k*) Grasshopper and Mormon cricket control	3,200	----------	----------
Subtotal	5,962	----------	----------
3. Plant quarantines	2,650	----------	----------
Total obligations payable out of reimbursements from other accounts	20,823	----------	----------
Total obligations	12,195,168	12,264,000	12,671,000

Obligations by objects

Object classification	1952 actual	1953 estimate	1954 estimate
Summary of Personal Services			
Total number of permanent positions	1,946	1,894	1,958
Full-time equivalent of all other positions	315	328	335
Average number of all employees	2,107	2,124	2,185
Average salaries and grades:			
General schedule grades:			
Average salary	$4,963	$5,111	$5,097
Average grade	GS-7.4	GS-7.7	GS-7.5
Personal service obligations:			
Permanent positions	$8,717,411	$8,853,744	$9,108,581
Part-time and temporary positions	844,869	814,902	826,247
Regular pay in excess of 52-week base	35,087	34,598	35,816
Payment above basic rates	206,427	186,351	195,241
Total personal service obligations	9,803,794	9,889,595	10,165,885
Direct Obligations			
01 Personal services	9,788,471	9,889,595	10,165,885
02 Travel	590,116	576,744	614,600
03 Transportation of things	81,302	74,964	84,400
04 Communication services	82,463	83,000	86,800
05 Rents and utility services	129,109	134,300	140,400
06 Printing and reproduction	69,629	78,500	80,600
07 Other contractual services	284,432	288,000	290,900
Services performed by other agencies	77,556	79,300	79,300
08 Supplies and materials	763,754	763,000	785,800
09 Equipment	231,602	226,782	271,800
10 Lands and structures	4,072	5,000	5,000
13 Refunds, awards, and indemnities	56,197	47,500	47,500
15 Taxes and assessments	16,036	17,800	18,500
Subtotal	12,174,739	12,264,485	12,671,485
Deduct charges for quarters and subsistence	394	485	485
Total direct obligations	12,174,345	12,264,000	12,671,000
Obligations Payable Out of Reimbursements From Other Accounts			
01 Personal services	15,323	----------	----------
02 Travel	1,200	----------	----------
07 Other contractual services	4,300	----------	----------
Total obligations payable out of reimbursements from other accounts	20,823	----------	----------
Total obligations	12,195,168	12,264,000	12,671,000

Analysis of expenditures

	1952 actual	1953 estimate	1954 estimate
Unliquidated obligations, start of year	$937,958	$1,176,352	$1,483,020
Obligations incurred during the year	11,392,180	12,243,200	12,671,000
	12,330,138	13,419,552	14,154,020
Deduct:			
Reimbursable obligations	78,574	75,832	81,000
Unliquidated obligations, end of year	1,176,352	1,483,020	1,558,020
Adjustment in obligations of prior years	33,415	----------	----------
Obligated balance carried to certified claims account	2,740	----------	----------
Total expenditures	11,039,057	11,860,700	12,515,000
Expenditures are distributed as follows:			
Out of current authorizations	10,200,390	10,810,000	11,239,000
Out of prior authorizations	838,667	1,050,700	1,276,000

Mr. ANDERSEN. The committee will come to order.

Mr. Hoyt, we are glad to have you before us once again. I personally regret that I will be unable to remain with the subcommittee this morning. Consequently, I am turning the chair over to Mr. Horan at this point.

Mr. HORAN. May I, for the record, inform the group here before us that the reason our chairman is leaving is that he is going up to investigate the terminal facilities at Philadelphia and New York. Some of our greatest difficulties in the distribution of agricultural products are involved in terminal facilities, of which New York presents one of the most conspicuous problems. Mr. Andersen is also going up to visit a laboratory where some special work is being done for the Bureau of Animal Industry, and while at Philadelphia, he plans to visit the regional laboratory of the Bureau of Agricultural and Industrial Chemistry.

We will insert in the record pages 281, 282, and 284 through 287 and 295 through 314 and 319 through 320 of the justifications.

(The material requested is as follows:)

PURPOSE STATEMENT

The Bureau of Entomology and Plant Quarantine as now established was formed in 1934 by consolidation of two existing bureaus and by adding certain functions previously carried on by other agencies of the Department. Federal research in entomology goes back to 1854. In 1878 a Division of Entomology was established in the Department of Agriculture, and in 1904 a Bureau of Entomology was organized.

The Bureau is authorized to perform the following activities:

1. Study the distribution, abundance, host plant relationships, life history, and habits of insects which are injurious or beneficial to agriculture and forestry, with a view to developing practical methods for destroying the harmful ones and promoting the increase and spread of the beneficial ones.

2. Investigate the habits and develop means for control of all insects annoying or affecting the health of man and animals, infesting human habitations, or injurious to industries.

3. Conduct chemical investigations to develop new insecticides and conduct research to improve methods and equipment for their application.

4. Apply control measures directed at eradication, suppression, or prevention of spread of insect pests and plant diseases in cooperation with Federal, State, and local agencies, private organizations, and in certain instances with the Governments of Canada and Mexico.

5. Enforce quarantines and restrictive orders to prevent the entry into the United States of dangerous plant pests and to regulate the importation of nursery stock, fruits, vegetables, cotton, and other plants and plant products likely to carry pests.

6. Enforce plant quarantines to prevent the spread of plant pests which have gained a limited foothold, cooperating with States in these activities.

7. Inspect and certify as to freedom from injurious pests and plant diseases plants and plant products intended for export, in order to meet the sanitary requirements of the countries to which shipments are consigned.

The work of the Bureau on insect investigations is carried on in cooperation with State colleges, agricultural experiment stations, other agencies of the Federal Government, associations, commercial growers, livestock owners, and beekeepers. The Bureau cooperates with States and local agencies in combatting insects and plant diseases, and in surveys to detect incipient and emergency outbreaks of insects and plant diseases.

The Bureau of Entomology and Plant Quarantine maintains its headquarters at Washington, D. C., with 5 regional administrative offices and approximately 400 laboratories or stations located throughout the United States and in Alaska, Hawaii, Puerto Rico, Mexico, France, and Egypt. The Bureau as of November 30, 1952, had a total of 2,298 full-time employees, 237 of whom were in Washington, and the balance in the field, and 206 part-time employees, employed during

the active season of the respective programs, including those engaged in work on the control of forest pests. This latter activity is described in a separate section of these notes.

	Appropriated, 1953	Budget estimate, 1954
Appropriated funds:		
Salaries and expenses	$12,188,168	$12,590,000
Control of emergency outbreaks of insects and plant diseases	1,000,000	1,000,000
Total appropriated funds	13,188,168	13,590,000

Salaries and expenses

	Insect investigations	Insect and plant disease control	Plant quarantines	Total
Appropriation Act, 1953	$3,869,000	$5,600,000	$2,700,000	$12,169,000
Reductions pursuant to—				
Sec. 411	−1,040			−1,040
Sec. 412		−592		−592
Transfer in 1954 estimates from:				
"Salaries and expenses, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration," for research on methods for eradication of the screwworm through use of radiant energy	5,000			5,000
"Salaries and expenses, Office of Administrator, Agricultural Research Administration," for services at the Agricultural Research Center	15,800			15,800
Base for 1954	3,888,760	5,599,408	2,700,000	12,188,168
Budget estimate, 1954	4,190,000	5,600,000	2,800,000	12,590,000
Increase	+301,240	+592	+100,000	+401,832

Summary of increases, 1954

Insect investigations:
To strengthen research on entomological problems, such as stored product insects, control of the pink bollworm of cotton, and the introduction, colonization, and utilization of beneficial insects ..... +$301,240
Insect and plant disease control: To round off estimate ..... +592
Plant quarantines: To strengthen inspection staffs at strategic ports of entry to guard against introduction and spread of injurious plant pests ..... +100,000

Project statement

Project	1952	1953 (estimated)	Increases	1954 (estimated)
1. Insect investigations:				
(a) Insects affecting food, feed, and fiber crops	$2,714,973	$2,690,260	+$301,240	$2,991,500
(1) Fruit insects	(841,288)	(837,700)		(837,700)
(2) Truck and crop and garden insects	(481,486)	(465,500)		(465,500)
(3) Cereal and forage insects	(574,876)	(563,100)		(563,100)
(4) Cotton insects	(269,112)	(284,100)	(+100,000)	(384,100)
(5) Bee culture and biological control	(311,504)	(358,260)	(+101,240)	(459,500)
(6) Stored product insects	(236,707)	(181,600)	(+100,000)	(281,600)
(b) Insects affecting forests and forest products	462,412	465,600		465,600
(c) Insects affecting man and animals	235,224	239,400		239,400
(d) Plant-pest-control investigations	411,397	493,500		493,500
(1) Identification and classification of insects	(183,347)	(204,300)		(204,300)
(2) Insecticide and fungicide	(228,050)	(289,200)		(289,200)
Subtotal	3,824,006	[1] 3,888,760	+301,240	4,190,000
2. Insect and plant disease control:				
(a) Japanese-beetle control	500,947	482,700		482,700
(b) Sweetpotato weevil control	238,069	238,000		238,000
(c) Citrus blackfly and Mexican fruitfly control	256,020	226,500		226,500
(d) Phony-peach and peach-mosaic eradication	158,834	156,100		156,100
(e) Barberry eradication	674,224	658,000		658,000
(f) Pink-bollworm and Thurberia-weevil control	1,237,252	1,214,900		1,214,900
(g) Golden-nematode control	311,897	344,900		344,900
(h) White-fringed-beetle control	703,740	682,400		682,400
(i) Hall-scale eradication	108,245	117,200		117,200
(j) Gypsy- and brown-tail-moth control	584,948	526,600		526,600
(k) Grasshopper and Mormon-cricket control	549,627	566,108	+592	566,700
(l) Insect detection and advisory service	236,151	386,000		386,000
Subtotal	5,559,954	[2] 5,599,408	+592	5,600,000
3. Plant quarantines	2,732,634	2,700,000	+100,000	2,800,000
Unobligated balance	284,394			
Total available or estimate	12,400,988	12,188,168	+401,832	12,590,000
Transferred in 1953 to "Salaries and expenses, Bureau of Animal Industry, Agricultural Research Administration," animal research	+8,000			
Transfer in 1953 estimates from "Control of emergency outbreaks of insects and plant diseases, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration"	−785,778			
Transfer in 1954 estimates from—				
"Salaries and expenses, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration," plant, soil, and agricultural engineering research		−5,000		
"Salaries and expenses, Office of Administrator, Agricultural Research Administration"	−17,210	−15,800		
Reductions pursuant to secs. 411 and 412		+1,632		
Total appropriation or estimate	11,606,000	12,169,000		

[1] Excludes $73,000 transferred from "Insect and plant-disease control" for research on pink-bollworm and biological control, 1953 only.

[2] Includes $73,000 transferred to "Insect investigations". See note 1, above.

STATUS OF PROGRAM

Insect Investigations

Current activities include studies on the distribution, abundance, host relationships, life history, habits, and methods of control of insects and the development of means of the utilization of natural enemies for the control of insect pests, including the importation of natural enemies of introduced pests which are injurious to agriculture and forestry. The work is carried on, through field tests and laboratory experiments, in practically every State, in Hawaii, Puerto Rico, Panama, and Mexico, and headquarters for foreign parasite work are maintained in France. Most of the activities involve cooperation with State colleges, agricultural experiment stations, other agencies of the Federal Government, associations, commercial growers, livestock owners, and beekeepers.

Insect pests affect all phases of agriculture, and are important problems in many industrial activities and in the home. The importance of a strong continuing research program to develop improved control methods is emphasized by the fact that losses inflicted by insect pests approximate $4 billion annually.

Research objectives include the following general purposes:

1. To develop means whereby the growers of fruits, nuts, truck and garden crops, cereal, forage and range crops, cotton, tobacco, sugar plants and other agricultural products, can control insect pests more effectively or more economically, thus increasing the net returns from their operations and insuring an ample supply of high-quality agricultural products.

2. To develop bioassay and chemical methods of measuring trace amounts of insecticidal residues and to evaluate the possible harmful effects of chemical residues occurring on or in plants and animals, or products derived from them, used for human consumption.

3. To devise the most effective and economical means of preventing or controlling insect damage to forest and shade trees, forest products, and shrubs.

4. To collect, rear, and import from foreign countries natural enemies—parasites, predators, and diseases—and establish them in sufficient quantities in the United States to combat serious insect pests of crops, and undesirable weeds.

5. To devise and improve methods of utilization of the honeybee for the production of honey and wax, and for the pollination of crops.

6. To develop control measures for those insects which transmit disease, annoy man, and attack livestock.

7. To devise the most effective and economical means of preventing or controlling insect damage to stored agricultural products, foods, and fabrics.

8. To identify insects and allied organisms for the quarantine, control, and research activities of the Bureau and for other Federal and State agencies, farmers, pest-control operators, and other private individuals of the United States, as well as for foreign institutions; and to collect, maintain, and furnish information as to the presence and abundance of insect pests.

9. To develop methods and apparatus for freeing commodities of pests under plant quarantine regulations so that they can move freely and safely in commerce.

10. To improve the chemical materials now employed in controlling insects, to develop new and better chemical materials and to devise improved apparatus and methods for their application.

EXAMPLES OF RECENT PROGRESS AND TRENDS

Insects affecting food, feed, and fiber crops

Fruit insects:

1. Dieldrin is the outstanding new insecticide for control of plum curculio, an insect affecting peaches in Georgia. In 1951 it gave effective control of an extremely heavy infestation, and perfect control of a light one. This material has also been found effective in the control of curculio on apples in Indiana. Unfortunately, dieldrin is extremely poisonous to human beings, and because of the residue hazard its use must be restricted to early-season applications.

2. Organic insecticides do not remain in soil indefinitely: Although DDT, applied to soil for Japanese beetle grub control, remains in the ground with little loss for several years, recent work has shown that much of it disappears after 5 years or more. The loss the first 3 years was less than 25 percent; however more than 70 percent of it had disappeared by the end of 7 years. Other materials were lost at a faster rate. Two-thirds of the aldrin applied had disappeared after 1 year, and only a trace was left after 2 years. Dieldrin was more persistent, two-thirds

remaining after 2 years. In most cases the reduced quantities present were still enough to control Japanese beetle grubs.

3. Concentrate sprays effective in apple insect control: Experiments and observations in Indiana and Washington have shown that insecticides may be effectively applied in concentrated form with a mist blower. Concentrations as high as 8X (one-eighth the usual amount of water) have been used wihtout difficulty. Spray deposits were usually heavier with the air blast concentrate equipment than with a conventional hydraulic sprayer. However, the air-blast machine gave slightly poorer distribution of the insecticide. Control of insect pests was good with the concentrate equipment wherever the material was well applied, but poor if the dosage was too low or the application too hurried.

4. Parathion controls scale insects on peaches and apples: When applied 4 or 5 times during the summer for curculio control on peach in Georgia, parathion also controlled the San Jose and Forbes scale. The scale infestations were reduced to a very low point by the treatment. Most of the scale insects found 5 months after the last application were dead. Similar results have been obtained in apple orchards in Indiana.

5. Studies carried on in cooperation with the Mexican Department of Agriculture, have shown that wild citrus trees are the most important in maintaining citrus blackfly infestations in wild land.

6. Oriental fruitfly program reduced: Investigation of the Oriental fruitfly in Hawaii continues at a somewhat reduced level. Phases of the program relating to exploration for foreign parasites for introduction into Hawaii, and area control, are being brought to a close. Emphasis will be given to work on commodity treatments and insecticides and to work with the bioclimatic cabinets to determine the potential importance of the pest at various points on the mainland. Attention will also continue to be given to studies of the biology and physiology of the insect, and to its relations to other fruitflies in the Islands.

Truck crop and garden insects

1. Improved pea-aphid control method widely adopted by growers in the Pacific Northwest: A method of controlling the pea aphid with sprays or dusts containing parathion, developed in cooperation with State agencies and industry, has been widely adopted by growers in Washington, Idaho, and Oregon. This has resulted in very effective control over large acreages formerly badly damaged by this pest. This method was used by growers on nearly 30,000 acres in 1951.

2. Extensive commercial use of a new dust controls aphids and leafroll disease on potatoes in semiarid area. Extensive commercial use is being made in the Yakima Valley of Washington of a dust mixture, developed in cooperation with State agencies, containing DDT, parathion, and sulfur. This mixture gives almost complete aphid clean-up within a few hours and controls the leafroll disease they transmit to potatoes.

3. Fundamental information for determining nozzle spacings, minimum spray boom lengths, and effective swath width as a basis for radical improvements in airplane-sprayer design, was obtained from research in Oregon, in cooperation with USDA agricultural engineers. Use of this information in large-scale control operations against the beet leafhopper saved California authorities approximately $200,000 in 1951.

4. Spraying for beet leafhopper control in its breeding areas reduces curly-top disease damage to beans. The application of DDT sprays to the weed host plants of the beet leafhopper in its nearby breeding areas will reduce the damage caused by curly-top disease transmitted by this leafhopper to garden beans in southern Idaho. Over 80 percent of this country's supply of garden beanseed is produced in this area.

5. Tests by industry reveal no adverse effect on flavor or aroma of tobacco on which TDE sprays or dusts had been used extensively to control hornworms and budworms. These sprays and dusts were developed in cooperation with State agencies.

Cereal and forage insects

1. Lower dosage of insecticides for grasshopper control an excellent possibility: Dieldrin at a dosage of as low as ½ ounce in one gallon of oil per acre was as effective as the now recommended 2 ounces of aldrin. Besides being as effective, dieldrin has a much longer residual effect.

2. New hessian fly resistant hard red winter wheat released. A resistant wheat was released under the name of Ponca jointly by the States of Kansas and Oklahoma. This wheat was developed in cooperative studies by the Federal and

State entomologists and plant breeders. It is anticipated that this new variety will largely replace the now widely grown variety Pawnee in eastern Kansas and Oklahoma.

3. In cooperation with the Utah Agricultural Experiment Station, a more effective insecticide was recommended for the control of the alfalfa weevil: This added dieldrin to the already recommended insecticide, chlordane, for the early spring control of the adult alfalfa weevil. It gives an insecticide which is effective under a wider range of weather conditions.

4. Effective control for the Southern corn root worm on peanuts recommended in cooperation with the Virginia Agricultural Experiment Station. Aldrin at 2 pounds per acre and toxaphene at 25 pounds per acre gave good control of the Southern cornroot worm, which also attacks peanuts. This increased the return per acre to peanut growers by as much as $100.

5. Methoxychlor, which leaves a nontoxic residue at a dosage of ½ pound per acre, is recommended for the control of the potato leafhopper on alfalfa.

6. New sweet-corn hybrid resistant to corn earworm released by the Purdue Agricultural Experiment Station as a result of cooperative work. This new hybrid is outstanding in quality and earworm resistance. The release followed 8 years of study and testing of this hybrid and makes available new sources of germ plasma for commercial use.

Cotton insects

1. Systemic insecticides may control many pests of cotton: Investigations with several organic phosphorous coumpounds indicate that the cottonplant may be made toxic to many pests without injury to the plant or its products. These compounds are most effective against aphids and spider mites, but some experiments have shown that they are also somewhat effective against other insects.

2. New insecticides effective against the boll weevil: Eight years ago calcium arsenate was the only insecticide recommended for boll-weevil control. Through research, benzene hexachloride, toxaphene, aldrin, dieldrin, and heptachlor have been discovered to be effective against the boll weevil. Many millions of pounds of these new organic insecticides are now used each year for boll-weevil control.

3. Sprays are replacing dusts for cotton-insect control: Until 5 years ago 99 percent of the insecticides used for cotton-insect control were applied as dusts. The discovery that low-gallonage emulsion sprays are as effective as dusts for the control of cotton insects and often more practical, has resulted in recommendations for the use of these sprays in all cotton growing States.

4. Reduction in the use of sulfur for control of cotton pests: The development and wide use of liquid sprays instead of dusts, and the discovery of new mite-killing chemicals, have been the chief factors in reducing the use of sulfur on cotton. This has helped meet the sulfur shortage to the extent of millions of pounds annually.

Bee culture and biological control.

1. The seed set of red clover is reduced by the presence of other plants more attractive to pollinating insects: In an experiment in Ohio last year in which difficulty was experienced in obtaining adequate pollination of red clover by honey bees it was found that nearby ladino clover was attracting most of the pollen collecting honey bees while nectar collecting bees were visiting alfalfa. Even increasing the number of bees to 7 colonies per acre on the red colver did not entirely correct the difficulty because of the large acreages of its competitor plants.

2. Work begun on collecting parasites of the pink bollworm and the beet leafhopper: Representatives of the Bureau have been sent to India and the Mediterranean area to find and collect parasites of the pink bollworm and the beet leafhopper, respectively. They will be shipped to the United States for colonization in infested areas.

3. Competitor plants of alfalfa are a highly important factor in determining the effectiveness of the use of honey bees for pollinating this plant: Investigations this past summer showed that at Bakersfield, Calif. as few as 3 colonies per acre set heavy yields of seed in 30 days. At Woodland, on the other hand, where plants more attractive to pollen-gathering bees were abundant, even 6 colonies per acre required 60 days or more to set a heavy crop. The bees collected only nectar at Woodland. When bees visit alfalfa simply for nectar, their efficiency in effecting pollination of this plant is low. Nevertheless yields of 500 to 1,000 pounds of alfalfa seed per acre were obtained from many fields in both places, when bees were numerous.

4. Attempts to colonize parasites of the wheat stem sawfly are under way: parasites of the wheat stem sawfly have been reared at Moorestown, N. J. from shipments received from France this year and have been shipped to Montana for liberation in areas infested with the sawfly.

Stored product insects

1. High frequency radio-wave treatment looks more feasible for stored grain: If results obtained in cooperative tests with the Bureau of Plant Industry, Soils, and Agricultural Engineering on high-frequency radio-wave treatment for stored grain can be repeated in the treatment of large bulks of wheat, this treatment has distinct promise as a means of disinfesting wheat. Recent improvements in equipment have made possible this new method of treatment.

2. Pyrethrum spray still most effective in controlling tobacco moths: Cooperative tests made in tobacco warehouses demonstrated almost perfect control of tobacco moths resulting from weekly spraying with a pyrethrum space spray.

3. Residual insecticides protect fibers for long periods: A special cotton insulation, developed by the Bureau of Agricultural and Industrial Chemistry, has been found free from German roaches for a period in excess of 18 months when treated by lindane, dieldrin, or DDT. Lindane and dieldrin applications have protected Spanish moss and tow fibers for the same period from feeding by the cigarette beetle or tow bug. Casein yarn has been protected over 3 years by any one of several residual-type insecticides. DDT has protected wool and hair felt and duck down for more than 3 years.

4. Chlordane best for ants: Practical field tests with various of the newer insecticides have shown chlordane to be highly effective in control of ants.

5. DDT protects rugs: A DDT-treated rug subjected to constant walking and weekly vacuum cleaning was still protected against insect attack when exposed to heavy infestations after 9 months.

6. Chlordane promising as soil treatment for white-fringed beetles: Three-year tests have demonstrated that chlordane can be substituted for DDT as a soil treatment in nurseries to permit the plants grown there to be certified for interstate shipment under the white-fringed beetle quarantine.

7. Large-scale fumigation of cottonseed may be practicable in pink bollworm control operations: A storage tank holding 3,000 tons of cottonseed was successfully fumigated in experimental studies. Over 1,300 pounds of fumigant were used in the one operation.

Insects affecting forests and forest products

1. Black turpentine beetle control: The black turpentine beetle is killing pines across the South from the Atlantic to Texas and seriously affecting the naval-stores industry in that region. In recent tests benzene hexachloride (in the form of dusts, water suspensions, and oil solutions) has been found effective on an operational scale in its control.

2. Tree characters symptomatic of attack by bark beetles: The removal from stands of ponderosa pines susceptible to attack by western pine beetles has proved to be an economical and effective form of preventive control of this insect in certain areas of the West. Recent studies have shown that the following tree characters are most indicative of susceptibility to the beetle: (*a*) fading or off color needles; (*b*) active spike tops; (*c*) very thin, open crowns; (*d*) dying terminal twigs and branches; and (*e*) short needles with small needle complements.

3. Effectiveness of ethylene dibromide emulsions in controlling Engelmann spruce bettle confirmed: Emulsions of ethylene dibromide are a satisfactory substitute for oil solutions of orthodichlorobenzene in controlling Engelmann spruce beetles. The use of the new formulation should decrease control costs inasmuch as it utilizes water, which is abundant, instead of oil which must be transported into the forest.

4. Aerial surveys of bark beetle infestations: In cooperative studies with a major lumber company and the University of California, it was determined that a reliable estimate of the number of bark beetle infested trees and the year of kill could be made by aerial photography. This will be of value in the detection and evaluation of bark beetle infestation.

5. Method developed for early detection of Saratoga spittlebug infestations: Investigations showed that a reduction of shoot growth of pines follows feeding by the Saratoga spittlebug and that this reduction can be detected by shoot-growth measurements. This finding may prove of value in the early detection of outbreaks thereby permitting application of control measures before trees are seriously injured.

6. Resistance of Jeffrey-ponderosa pine hybrid to bark beetles: In cooperative studies with the Institute of Forest Genetics, California Forest and Range Experiment Station, it has been found that resistance or susceptibility of a tree to insect attack is determined by the kind of oleoresins it produces.

7. Control of drywood termites: Applications of benzene hexachloride, chlordane, or DDT to the surface of wood containing infestations of drywood termites near the surface have been found to be an effective control measure. These insecticides have also effectively controlled deep-seated infestations when they were injected under low pressure into the wood.

8. Aerial survey of spruce budworm infestations: A study conducted cooperatively with the State of Maine indicates that spruce budworm infested forests could be surveyed faster, more intensively, and more economically from the air than form the ground.

Insects affecting man and animals

1. Toxaphene dips for controlling ticks: Recent chemical analyses of toxaphene dips used for controlling ticks on livestock showed that dipping cattle in deteriorated emulsions was equivalent to dosing them with double the amount of toxaphene.

2. Dieldrin sprays for fire-ant control: Two pounds of technical dieldrin per acre controlled fire ants for 1 year in 1-acre experimental plots.

3. Killing screwworms by internal treatment of animals: Screwworms were killed in guinea pigs when lindane or aldrin was injected beneath the skin of the animal.

4. EPN highly toxic on mosquito larvae: Laboratory studies and preliminary field tests have shown that a new organic insecticide called EPN is highlyeffective for controlling mosquito larvae that have developed resistance to DDT.

5. Temporary control of mosquitoes around camp sites: DDT applied at the rate of 2 or 3 pounds per acre gave almost complete daytime control of mosquitoes in areas of from 1 to 10 acres. For a 2-hour period at sundown, however, migrating mosquitoes had to be killed with a mist spray of either allethrin or pyrethrum.

6. New method of marking insects for migration studies: Further progress has been made in using radioactive substances to mark insects so that their habits and migration can be studied. A simple method of treating plant-feeding species has been devised which consists of dipping the insects in specially prepared liquids to which the radioactive material is added.

Plant pest control investigations

Identification and classification of insects

Insect identification aids many agencies and individuals.—Identifications essential for determination of correct control procedure were furnished Federal agencies, State agricultural experiment stations, various other institutions and individuals. More than 80,000 samples were identified in the fiscal year 1952, as compared to 62,000 in 1951. In addition, about 40 publications designed to improve the bases for accurate identification in various groups of insects and mites have been issued, including a 1,400-page work on the Hymeniptera (ants, wasps, bees, gallflies, parasites, sawflies) of North America.

Insecticide and fungicide investigations

1. Improvements in Aerosol Production and Inspection: Production of insecticide aerosol bombs, an invention of this Bureau, now amounts to about $75 million annually. Filling procedures have now been developed which provide protection from moisture which causes corrosion and failure of containers and valves, and have caused considerable losses. This has been found to be an important factor in the effective performance and the storage life of insecticide aerosol bombs.

2. Analytical methods for benzene hexachloride residues: A method has been developed for the detection of very small amounts of benzene hexachloride. This has proved useful in the analysis of soils and plant products for traces of this insecticide. The tremendous interest in the occurrence and effect of insecticide residues on food products makes the development of accurate and specific analytical methods for minute amounts of insecticides especially timely. The above method also has been adapted, by the development of a suitable sampling procedure, to the determination of lindane vapor in air. This is important because of the increasing use of lindane vaporizers for fly control.

3. Methods of analysis of allethrin investigated: A study has been conducted in collaboration with the insecticide chemical analysis committee of the Chemical

Specialties Manufacturers Association on methods for the analysis of allethrin, the synthetic pyrethrinlike insecticide developed by chemists of this Bureau. This is being used on a large scale in insecticidal aerosols. As a result of the collaborative work, two methods have been proposed and are now in use. Efforts are being continued to improve their accuracy.

4. Insecticide residues studied: In cooperation with insecticide manufacturers, studies have been made of the residues resulting from the application of several insecticides. These included an investigation of the amount and distribution of DDT residues on corn resulting from application of different types of DDT spray formulations; a study of the magnitude of malathon residues deposited on various fruits and vegetables from different spray formulations; and an investigation of possible contamination of wheat stored in chlordane-treated bins. These studies have an important bearing on the development of effective, and especially the safe, uses of insecticides

Insect and Plant Disease Control

Current activities provide for protection of American agriculture from certain destructive insect pests and plant diseases, by conducting, in cooperation with States, operations to control, suppress, and prevent spread of these pests and plant diseases, including surveys to detect the status and occurrence of insect pests.

Among the undertakings now in process, the following are selected as typical:

1. Retarding the spread of the Japanese beetle to noninfested sections of the United States and suppressing infestations in newly located outlying areas: This involves inspection and certification of commodities likely to carry the beetles from the regulated areas, comprising all or parts of the 15 States in the eastern part of the United States.

2. The prevention of spread of the sweetpotato weevil and its eradication from commercial producing areas: The operations are conducted in cooperation with the States of Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.

3. The prevention of spread of the Mexican fruitfly from the citrus-producing area of Texas: Control and regulatory activities in connection with the citrus blackfly in Mexico consist of—

(*a*) Inspections in Mexico to determine location and intensity of infestations.

(*b*) Cooperation with National, State, and local officials in Mexico (1) to control the citrus blackfly and (2) to prevent its spread to uninfested areas. These activities are advisory.

4. Suppression and prevention of spread of the phony peach and peach mosaic diseases: These activities are conducted in cooperation with southern States from California to South Carolina.

5. Control of the destructive stem rust disease of wheat, oats, barley, and rye by the eradication of barberries which are the alternate host of the disease: Control work is conducted in 18 grain-growing States.

6. Eradication, suppression, control, and prevention of the spread of the pink bollworm from areas where it is now present: These operations are carried on in cooperation with all the major cotton-producing States and the Republic of Mexico.

7. Eradication, suppression, control, and prevention of spread of the golden nematode is carried on in cooperation with the State of New York, particularly in Nassau and Suffolk Counties where the only known infestations in the United States occur. Precautionary surveys are made in other major potato- and tomato-producing States.

8. Control and prevention of spread of white-fringed beetle is carried on in cooperation with eight Southeastern States.

9. Eradication of Hall scale: Activities are conducted in cooperation with the California Department of Agriculture to eliminate this destructive scale insect which is known to occur only in limited areas in that State.

10. The prevention of spread of the gypsy and brown-tail moths. Work is conducted in timberland areas along the western border of the New England section to repel advance to the west and to eradicate progressively to the east.

11. Grasshopper and Mormon cricket control: Surveys are conducted to determine current status of grasshopper populations and such information is made available upon which growers and control groups can plan suppressive programs. Technical assistance is provided to organize control groups in the planning,

execution and checking of large-scale grasshopper control operations. When emergency grasshopper situations arise, cooperation is effected with States and organized grower groups in carrying out control operations.

12. Surveys to detect the status and occurrence of insect pests: Surveys are currently being conducted on the chinch bug, fire ant, citrus canker, cotton insects, screwworms, and European corn borer, as well as on other pests of deciduous fruits, vegetables, and tobacco.

EXAMPLES OF RECENT PROGRESS AND TRENDS

Sweetpotato weevil control

1. Status of stored sweetpotatoes in Louisiana greatly improved: In cooperation with State and local agencies and shippers, weevil infestation conditions in stored sweetpotatoes in Louisiana have been greatly improved through (1) suppressing weevil populations in the field brought about by the use of certified or treated seed potatoes, (2) destruction of excess tubers in seedbeds and the rotation of plantings, and (3) enforcement of sanitary procedures at kilns and packing sheds.

Citrus blackfly and Mexican fruitfly control

1. Citrus blackfly: Intensive inspections made in cooperation with the Mexican Department of Agriculture in areas close to the international border have so far proved effective in detecting incipient infestations of the citrus blackfly so control measures can be taken immediately. Prompt control action, together with the enforcement of foreign plant quarantines, have thus far apparently prevented the introduction of this insect into American citrus plantings.

Research to develop more effective spraying procedures and to obtian additional information on natural enemies of the citrus blackfly is continuing so that effective control measures will be available should the fly gain entrance into the United States.

2. Mexican fruitfly: Surveys in Texas and Mexico are being continued, as well as the sterilization of citrus fruit moving from infested to noninfested areas. So far as is known, the infestation is still confined to a small area in Texas and Mexico. This program is on a cooperative basis with the Republic of Mexico, where average losses amount to about 30 percent for mangoes, guavas, and oranges, with an even higher percentage for grapefruit. The purpose of the program is to prevent the spread of this pest from the eight citrus-producing counties in the lower Rio Grande Valley of Texas, where now located, to areas free from the insect.

Phony peach and peach mosaic eradication

1. Status of phony disease in wild plum. A survey of wild plum, a recently discovered alternate host to the phony disease, was made in 1950–51, in 11 States employing a recently developed chemical testing method. Phony disease was found in wild plum trees in 50 counties at 143 locations in Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas. Discovery that the wild plum is an alternate host to the disease and is so widely spread throughout the peach-growing areas presents new problems with respect to control of the disease.

2. Encouraging results are indicated in an experimental spray program started 3 years ago to determine the possibilities of suppressing populations of the leafhoppers which have been found to transmit phony disease from tree to tree. Because of the long incubation period of the disease at least another year is needed to fully evaluate the possibilities of this approach to control.

3. An increasing number of growers are organizing control districts and are including both infected peach trees and wild plum in their cleanup programs.

Barberry eradication

1. Continued progress was made in barberry eradication in 1951. More than 14,400,000 barberry bushes were destroyed on 1,517 new and 2,029 old properties. Twenty-five percent of the old properties were reinfested. A total of 24,191 square miles were worked in 324 counties in the 18 cooperating States. The area on maintenance was increased by over 22,000 square miles. Cooperating State and local agencies aided the work by contributing funds and services amounting to $262,638.

2. The present status of this project shows 914,039 or 89 percent of the 1,031,065 square miles in the control area has reached a maintenance condition as compared with 87 percent in the previous year. The remaining 117,026 square miles that require rework comprises solid blocks of counties in Pennsylvania, Virginia, West Virginia, Missouri, and Washington and thousands of barberry sites in the cooperating States. Barberry seed may remain viable about 15 years in the soil

so it requires two reworkings at 5-year intervals before these infested sites can be considered free of bushes.

3. Stem rust was light in 1951 with damage confined largely to crops growing close to barberries: Race 15B of the wheat variety was found widely distributed from Texas and Mississippi to Canada, and from Virginia and Pennsylvania to the Rocky Mountains. It is also established in central Mexico. This race was obtained from more than half the 686 wheat collections and was the most prevalent. It attacks all commercial varieties of wheat. With favorable weather conditions it is a hazard to crop production of highest importance that could be the difference between a normal and a low grain supply for the Nation. Race 7 of oat stem rust was also widely distributed.

4. 2,4-D applied as a foliage spray on the native barberry in Colorado was just as effective and less costly than the mixture 2,4-D+2,4,5-T. Two chemicals, MCP (2-methyl, 4-chlorophenoxyacetic acid) and a formulation of 2,4-D, 2,4,5-T plus a penetrant, gave promising results on the common barberry, *B. vulgaris*. The number of nurseries and dealers requesting permits to ship rust-resistant barberries interstate increased from 296 to 359.

Pink bollworm and thurberia weevil control:

1. The pink bollworm, generally recognized to be the most serious of all cotton pests, during 1952 infested new areas for the third successive year in spite of intensive control efforts.

Weather conditions at the critical crop seasons have prevented farmers on both sides of the Mexican border from full compliance with stalk destruction regulations which require clean fields by specified dates. This, together with weather favoring the overwintering of pink bollworm larvae, has resulted in the extension of the generally infested area and intensification of infestation in the lower Rio Grande counties. This pest is now found in Texas, Oklahoma, Louisiana, New Mexico, and Arizona. Present control measures are proving inadequate under such weather conditions.

New infestations occurred in 1952 in 18 additional counties in Texas and 2 in Oklahoma. These were added to the area under regulations governing movement of cotton and cotton products that might further spread the area of infestation. Cooperative efforts of Federal and State agencies have been intensified to strengthen existing methods of control. This has included revisions of quarantine regulations and increased emphasis on research to develop control measures which would be less subject to interference by inclement weather. (The current trends on research work are discussed under "Insect Investigations.")

2. Wild cotton eradication in Florida. Over 11,000 acres of largely inaccessible wild cotton land was surveyed. Some 30,000 wild cotton plants were destroyed, about 4 percent with maturing fruits. Bolls, blooms, and squares collected contained 73 pink bollworms, a tremendous reduction from the 571 pink bollworms collected from over 13,000 plants the previous year. In addition, 346 pink bollworms were taken from over 19,000 fruiting forms collected from dooryard cotton plants on a single private property. This work is resulting in a pronounced reduction of both pink bollworms and seedling plants.

Golden nematode control

1. During the calendar year 1951, new infestations of the golden nematode were found on an additional 848 acres in Nassau and Suffolk Counties, Long Island, N. Y. Surveys outside of Long Island have been conducted in potato-growing areas in cooperation with 22 States, primarily in the East and Middle West.

2. Compensation to owner operators who withhold infested land from production has been reduced from $80 to $60 per acre, shared equally by the State of New York and the Federal Government. Four additional nursery properties in Long Island were found to be infested, bringing the total to 68. These have been effectively treated with D–D.

White-fringed beetle control

1. During 1952 new infestations of white-fringed beetle were found in 4 additional counties in Mississippi, 1 county in South Carolina, and 1 parish in Louisiana. During the past year a definite spread has occurred within the generally infested areas, but beetle populations are low due to the general application of control measures. Infestations as of June 30, 1952, are known to have occurred in 354,505 acres in 149 counties in 8 Southern States.

2. Groups of farmers and others are assuming greater responsibility in the treatment of infested lands under the technical guidance of Bureau and State

personnel. Surveys and the enforcement of the quarantine regulations continue to be a joint responsibility of the Bureau and the States concerned. Growers, nurserymen, shippers, and others are participating more fully in the purchase of insecticides and application of treatments required for the certification of commodities moving from infested to noninfested areas.

In accordance with the recommendations of the study group (appointed by the Secretary of Agriculture to review the control programs of the Bureau, pursuant to the recommendation of the House Appropriations Committee in its report on the 1952 appropriation act) a greater responsibility for providing needed equipment for application of insecticides to cropland is being assumed by the land owners and operators. This shift in responsibility from the Federal Government will permit a greater emphasis on providing information and assistance in organizing groups to insure adequate coverage of infested areas, thereby reducing current damages and the hazard of further spread.

Hall scale eradication

Progress continues toward the eradication of Hall scale in California: Surveys, inspection, and treatments have been intensified and the voluntary host-removal program on infested properties encouraged. Additional infested properties have been found in the Bidwell Park area, necessitating some expansion in the treatment program to include all hosts on an area basis rather than an individual landownership basis. Steady progress is now being made with the manpower and equipment available from State and Federal sources toward the completion of this program in known areas of infestation.

Gypsy and browntail moth control

1. During the spraying season of 1952 (May and June) a total of 217,141 acres was sprayed, principally in New York. It is anticipated that after this season, except for mopup operations, the gypsy moth will have been eliminated from an area comprising about 2,300 miles west of the Hudson River in New York.

2. Trapping surveys in Pennsylvania during the late summer of 1951 revealed a small gypsy moth infestation near Scranton adjacent to areas treated with DDT during the period 1946–49. In May and June of 1952, a total of 21,105 acres was sprayed in this area. Trapping will be conducted again this year in an effort to locate any additional infestations that may have escaped detection and control efforts.

3. The study group appointed by the Secretary of Agriculture recommended that a 5-year eradication program of the gypsy moth be undertaken at a total estimated cost of $25 million the Federal Government to contribute approximately one-third of the cost. The Conservation Committee of the Council of State Governments met on May 15 and 16, 1952, to consider this recommendation. A resolution was passed requesting that the Bureau conduct an appraisal survey and recommend a plan—either of eradication or of control. Such survey is currently underway and will be completed sometime during the winter 1952–53.

Grasshopper and mormon cricket control

1. Relatively small, widely scattered infestations from Arizona and New Mexico to Montana and Idaho characterized the grasshopper situation in 1952. Extended periods of drought, particularly in the Southwest, favored grasshopper development and contributed to local emergencies. Surveys just completed indicate similar situations in 1953 with the more critical areas expected in Montana, Wyoming, Idaho, Arizona, New Mexico, and California. Mormon crickets were more numerous in Western States than at any time during the past 12 years. Migrating bands were combated in Nevada, Utah, Idaho, and Colorado. The 1952 fall survey indicates that this insect may be approaching an outbreak cycle but it is believed that the more critical areas are known and that a preventive type of program in 1953 may forestall a major outbreak later on.

2. Federal assistance on control programs, other than surveys and technical assistance in control, has been limited to lands of Federal ownership and to low value rangelands where organized rancher groups and the States have provided a major share of the cost of control. Again in 1952 control on croplands has been carried on by individual farmers with only technical assistance from State and Federal sources.

Insect detection and advisory service

1. Reports on the more important insect conditions were summarized and issued periodically during the fiscal year 1952. Steps were taken to improve the acquisition and dissemination of current information on economic insects through-

out the Nation by enlisting the cooperation of all entomological workers. In this program all 48 States have established offices for receiving and summarizing information on economic insects and forwarding this to Washington for national release. Beginning in May 1952 such cooperative reports covering activity of insect pests of many kinds have been issued weekly. Detailed records are maintained on the distribution and abundance of various domestic and foreign economic insects.

2. Fire-ant survey: Fire-ant surveys were made throughout the Southeast and into Texas. The fire-ant infestation in the Houston area appears to have been eradicated. Except in local areas where control has been attempted, there has been no change in the fire-ant populations.

3. Boll-weevil surveys help farmers, county agricultural agents, and the insecticide industry: The cooperative cotton insect surveys have disclosed that the early boll-weevil infestations in 1952 are spotted. They vary greatly from county to county and even from field to field. Serious infestations have been reported in some areas in at least 10 States including North Carolina, South Carolina, Texas, and Oklahoma. Knowledge of the distribution and abundance of the boll weevil early in the season is of special value to the cotton growers and county agricultural agents in making preparations for the control of this pest, and to the insecticide industry in planning the formulation and distribution of insecticides.

4. Surface-trash examinations furnish reliable information concerning winter survival of boll weevils: Early each spring before the boll weevils reach the cottonfields, farmers, county agricultural agents, and many others want to know about the relative number of weevils that survived the winter. The examination of surface trash collected from woods adjacent to old cottonfields is the most effective method that has yet been devised to determine the number of weevils that have survived the winter as compared with previous years. For 15 years the surface-trash examinations were made only at the field laboratories at Tallulah, La., and Florence, S. C. The interest in winter survival has caused considerable expansion in these investigations, and during 1952 surface-trash examinations were made by entomologists in Tennessee, North Carolina, Georgia, Alabama, Louisiana, and Arkansas. In future years farmers and others interested in cotton production will have more accurate and reliable information concerning boll-weevil survival and abundance during March, April, and May than was available in previous years. This is part of the cooperative cotton insect survey program.

5. Screwworm survey: Screwworms overwintered over a greater than usual area in Texas and south of a line from Tampa to Cocoa, Fla., in the Southeast during the winter of 1951–52. Drought in the Southwest has kept their numbers at a minimum.

6. European corn-borer survey: This survey, in cooperation with 15 Eastern and North Central States, provided current weekly releases as to the development of the corn borer and the need for the application of sprays. This service was effective in obtaining maximum benefits from insecticide applications and in assisting to increase the much needed corn production. The information was made available to the growers and insecticide industry for their guidance. The trend of the population continued downward during the 1951 crop season.

Plant Quarantines

Current activities: Measures are taken at mainland ports of entry and in Alaska, Hawaii, and Puerto Rico, to prevent introduction from abroad of insect pests and plant diseases detrimental to American agriculture. Plants and plant products for export are certified for compliance with sanitary requirements of other countries. Inspection of domestic plant materials in transit within the continental United States is performed to enforce regulations for preventing spread of injurious insects and plant diseases.

Cooperating agencies include: The Bureau of Customs; Immigration and Naturalization Service; Post Office Department; Public Health Service; and State, Territorial, and insular plant quarantine services.

Among the undertakings now in process, the following are typical:

1. Inspection of foreign air traffic: Planes from foreign countries are inspected to prevent the introduction of plant pests through air commerce.

2. Preflight inspection: Aircraft are inspected in Hawaii and Puerto Rico prior to departure for the mainland to detect the presence of prohibited or restricted plant material.

3. Inspection of surface traffic: Inspection of ship, train, vehicular and pedestrian traffic is conducted at the borders of the country, and at the major ports of entry.

4. Inspection at strategically located transportation centers to intercept shipments of commodities moving in apparent violation of Federal and State quarantines is conducted.

EXAMPLES OF RECENT PROGRESS AND TRENDS

1. Inspection of airborne traffic reaches all-time high. During the calendar year 1951 a total of 85,605 aircraft carrying 1,824,970 passengers were examined by plant quarantine inspectors at airports in the continental United States, Hawaii, Puerto Rico, and Alaska. This represents an increase of 18 percent over the number of airplanes examined in 1950 which, in turn, had been a record year. Inspections resulted in the interception of 51,934 lots of unauthorized plants and plant products from airborne traffic, much of which was found to be infested or infected with injurious insect pests and plant diseases. Among the more important pests apprehended were the citrus blackfly, the oriental, Mexican, West Indian, and Mediterranean fruitflies, the olive fly, and destructive pests of cereals, beans, grapes and many other products.

2. Airplane load of disease vectors intercepted in Hawaii: An airplane arriving in Hawaii from Fiji was found to have thousands of leafhoppers aboard which proved to belong to a species considered to be the probable vector of the Fiji disease of sugarcane. This disease which causes serious damage to sugarcane, is not known to occur in the Hawaiian Islands where sugarcane is one of the two major crops. The infested airplane was sprayed twice with a heavy dosage of aerosol containing DDT to insure that none of the insects escaped.

3. Vehicular traffic from Mexico continues to break records: In 1951, 11,332,190 vehicles were inspected on the Mexican border, an increase of 29 percent over 1950, which had been the heaviest year on record up to that time. In addition to the citrus blackfly other serious pests of citrus, avocados, potatoes, cotton, and other agricultural products were repeatedly intercepted at the border.

4. The demand for plant quarantine inspection of maritime traffic has grown steadily since shortly after the end of World War II, and current trends in world travel and commerce indicate that this traffic will be even greater in the future. In the calendar year 1951 a total of 45,452 ships were inspected, an increase of almost 7 percent over the previous year. About one-fourth of the vessels examined carried unauthorized plant material and hundreds of lots of destructive pests were intercepted in ships' stores, quarters, cargo, and passengers' baggage. Interceptions of the golden nematode of potatoes were taken so frequently as to be commonplace. During May and June 1952, 3 shipments of Spanish potatoes and 1 of potatoes from the Canary Islands were found infected with that pest and were refused entry. A complete list of the insects and diseases from points throughout the world, taken as a result of ship inspection, would include destructive pests of practically all major crops.

5. Pest risk eliminated from importations of Netherlands bulbs at source: As the result of a request received from appropriate officials of the Netherlands Government, supported by the bulb exporters of that country, plant-quarantine inspectors were sent to Holland, at no additional cost to the Bureau, for the purpose of examining, prior to shipment, bulbs destined to the United States. This arrangement resulted in a much more thorough examination of the bulbs than would have been the case on the piers in the United States and with less manpower. In brief, it was possible to dispose of infested and infected bulbs at source rather than in the port of entry in the United States with considerable savings in cooperage and other expenses to the shippers and importers.

6. Expanding world travel and commerce increase threat of invasion by foreign pests: In 1951 plant-quarantine inspectors intercepted a total of 155,117 lots of unauthorized plant material, an increase of nearly 11 percent over the previous year. Thousands of lots of destructive pests, including insects, plant diseases, nematodes, and snails, were taken from this material. The oriental and Mediterranean fruitflies and the melon fly were taken en route to the rich agricultural areas of California; the citrus blackfly was intercepted en route to citrus areas of California and Texas, and the golden nematode of potatoes was found on numerous occasions with potatoes destined to points throughout the United States. In brief, plant-quarantine examination of foreign and Territorial traffic has repeatedly demonstrated that all of our major crops, our forests, and our nurseries are under constant threat of invasion from foreign pests. It has also been proved that this threat increases in direct proportion to the volume of travel in commerce which, according to all indications, will continue to increase for some time to come.

Statement of obligations under allotments and other funds

(Includes only those amounts which, by Nov. 30, 1952, were actually received or programed for 1953 or 1954. Since work for other agencies is performed on a service basis, at the request of those agencies and for their benefit, it is not practicable to estimate in advance the amounts to be received in most cases)

Item	Obligations, 1952	Estimated obligations, 1953	Estimated obligations, 1954
Agricultural Marketing Act, Agriculture (Bureau of Entomology and Plant Quarantine): Marketing research	$81,302	$101,000	$112,000
Control of forest pests, Agriculture (Bureau of Entomology and Plant Quarantine):			
Forest Pest Control Act	325,037	[1] 959,000	[1] 824,500
White pine blister rust:			
Leadership, coordination, and technical direction of white pine blister rust control	672,600	681,482	682,000
Cooperative blister rust control on State and privately owned lands	335,943	363,000	663,000
Total, control of forest pests	1,333,580	2,003,482	2,169,500
Working funds, Agriculture (Bureau of Entomology and Plant Quarantine) advanced from:			
Department of the Army:			
For investigations and the development of control measures on insects and other arthropods of importance to the Department of Defense	605,288	640,000	
For conducting experimental investigations, studies, and tests in connection with the development of special scientific equipment		19,000	
Department of the Navy:			
For investigations and the development of control measures on insects and other arthropods of importance to the Department of Defense	13,510	25,000	
Total, working funds	618,798	684,000	
Miscellaneous contributed funds, Department of Agriculture (Bureau of Entomology and Plant Quarantine): Cooperative work on blister rust control and barberry eradication; inspection and clearance of flower bulbs from the Netherlands to the United States; research on insecticides; study of State and Federal laws relating to pink bollworm of cotton; and expanding and intensifying research designed to control the pink bollworm	201,195	255,000	255,000
United States dollars advanced from foreign governments, United States information and educational program (trust fund) (Bureau of Entomology and Plant Quarantine): To perform quarantine services in connection with preventing the introduction of the Oriental fruitfly into Australia and New Zealand	5,160	5,340	
Obligations under reimbursements from Governmental and other sources:			
Salaries and expenses: For plant quarantine inspection service, testing of insecticides, and sale of personal property	78,574	75,832	81,000
Agricultural Marketing Act: For tests for fumigation of grains	2,500		
Control of Forest Pests: For fire fighting and sale of personal property	84,575	7,600	7,600
Total obligations under reimbursements	165,649	83,432	88,600
Total, obligations under allotments and other funds	2,405,684	3,132,254	2,625,100

[1] Includes $500,000 contingency fund.

Mr. HORAN. We would like to have a general statement from you, Mr. Hoyt, but before we begin I want to say this. This subcommittee appreciates the nature of your job. We might be able to help you gentlemen. You are at the top echelon of administration. We cannot run your Department; we do not intend to. We intend to help you in any way we can.

Mr. HOYT. Yes, sir.

Mr. HORAN. This subcommittee exists for the purpose of encouraging efficient administration; we can help you in that direction. While

we cannot, in the exercise of administering the disposition of the taxpayer's dollar, run your department, we can find out what your problems are and whether we can help you in the correction of situations which need correction. We have demonstrated that time and time again and especially so when we know that you are sincere and trying to do a good job.

I have said these things, Mr. Hoyt, because we want to discuss frankly and thoroughly the administration and functions of the Bureau of Entomology and Plant Quarantine.

INVITATION TO MEMBERS OF CONGRESS TO VISIT FIELD ACTIVITY

Mr. HOYT. Thank you, Mr. Chairman. Before making a general statement, inspired by what you said with reference to the absence of Mr. Andersen this morning, any time the members of this subcommittee have occasion to be in New York, and have a moment to spare, we would be very happy if they would call at out quarantine inspection house in Hoboken. I believe you would find it of interest. I do not know that we have had occasion to invite the members of this subcommittee to visit this, or other field points at which our work is conducted.

We have a good many Members of Congress who have been hearing recently about a proposal to permit the growing of nursery stock in foreign countries in peat moss for a few months in order to get it reestablished before shipping to this country and there has been a great deal of interest in that proposal on the part of importers, shippers, and nurserymen. They have asked Members of both Houses of Congress to ask questions of the Bureau with reference to it. At this moment, there is probably a maximum amount of nursery stock on the floor up there at the Hoboken Inspection House. It would be a very opportune time to visit it and if any of you at any time happen to be in Hoboken and have a moment to spare, we would certainly be glad to have you stop there.

Mr. HORAN. I hope our Chairman will be able to drop in at that reception center. He will get some concept of what your problems are.

SAN JOSE SCALE

We have a very troublesome disease out in the State of Washington, in all the horticultural stations known as the San Jose scale. It is not San Jose scale at all; it is a Chinese scale, but it got the name, San Jose scale, because it came in through San Jose, Calif., years ago. The scale can only live on the live plant life. It feeds on the cambium layer of apple trees and pear trees, particularly pome fruits. But in order to enable the control of it in the State of Washington at least, our own growers out there enacted a law 40 years ago prohibiting the shipment of anything that had scale marks on it in interstate commerce or international commerce.

Now, there is no possibility of that disease being communicated on the fruit that we produce there. This is an interesting thing which relates to your Bureau. Yet, whole shiploads of fruit have been condemned in foreign ports—this is a matter of record—because of scale marks on fruit that we tried to sell abroad. So a complete understanding of your inspection of entering nursery stock and what

might follow after it is received here, and what might constitute control of that disease, is a mighty interesting thing.

Mr. HOYT. Yes, it is. We would certainly be happy to have any members of the subcommittee at any time when they are in New York drop in there. We can give you a tour of the place on a 5-minute basis or any additional amount of time you can spare.

RELATION OF CHANGES IN BUREAU'S ACTIVITIES TO COMMITTEE'S STUDY

Now, with reference to your comments about the subcommittee's interrogation of the Bureau during the last 2 or 3 years, I think that we accept that in the spirit in which it was offered. Mr. Chairman, we appreciated your pointing up the fact that, because of the system which did not give us here in Washington a clear picture of the situation at some points in the field, that there was a buildup in the inventory of certain items of equipment which, I feel quite sure, we would not have approved, or which, having occurred, we would have taken steps to reduce to a realistic level compatible with the requirements of the need for such facilities had we been aware of the overstocking earlier.

In all fairness, Mr. Chairman, I should say, too, that the same report which referred to high inventories of equipment covered other matters to which we gave prompt attention. I hope I am not incorrect in stating to the subcommittee that appropriate corrective measures have been instituted and that thereby we have removed any substantial grounds for criticism with reference to the items the committee brought to our attention.

PROBLEMS, ACTION TAKEN AND FURTHER PLANS

We wanted to present to the committee this morning a report of what we have been doing and our plans for continuing the programs. We wanted to talk particularly about some of our more pressing problems. We want to tell you what we have done under our own power to deal with those problems and then to talk a little bit about the plans that we hope we are going to be able to carry out as time goes on, to meet them further.

PROBLEM RELATING TO THE CORRECT IDENTIFICATION OF INSECTS

One of our first problems, and it is one that is always with us, is not involved in an immediate request for an increase in funds. It is the identification of insects. We never can fully impress on people the difficulty and complexity of the problem of knowing what form of insect life we are dealing with in a particular case. There are about 700,000 known, described species of insects today and our Taxonomic Division is adding to that at the rate of about 10,000 additional species a year. We have brought 2 or 3 specimens to illustrate the difficulty and the complexity in the determination of these insects. In this little box is one that has been discussed before this subcommittee a good many times. These are the adults of the screw worm flies which attack livestock, particularly in the southern half of the United States. There are two kinds there and I defy anyone, except a trained entomologist, to tell which is the primary screw worm fly and which is the secondary or ordinary blow fly.

Mr. HORAN. How often is the entomologist correct?

Mr. HOYT. He should be able to make the correct determination. But it was along in the thirties before it was possible to distinguish them and prior to that time the control of the screw worm in livestock was not being handled successfully. From that time on, since we knew the difference in the two, we have been able to get effective control of the screw worm. But that illustrates why it takes a specialist to tell you what you are working with. You have seen two species of insects that so closely resemble each other.

In this second box is an example of exactly the opposite situation. These eight insects look different but they are one and the same species of insects. They could and probably would be taken for 6 or 7 different species because there are such striking differences in color, size and shape. Notice the color ranges from a bright red to a shiny black.

You could make 6 or 7 different species out of those very easily because there is a strong difference.

We have to determine the identity of numerous insects in larval form. So the committee might get a representative problem in this area, we brought this third little box containing two larvae. One is the Japanese beetle grub and the other is one of the other white grubs, and again that illustrates the difficulty in differentiating one from the other. You can see that is a job for specialists.

Mr. HORAN. To the producer of agricultural products, the larva is what does the damage, not the fly.

INSECTICIDES: THEIR DEVELOPMENT, USE, AND TESTING

Mr. HOYT. Another problem that confronts the Bureau and is a more or less continuing one is in the whole field of insecticides: Development, testing, use, precautions that are necessary to accompany their use, the problem of residues, and harmful-effects resistance by insect and all that kind of thing, has presented a very important problem.

DEPARTMENTAL DEVELOPMENT OF AEROSOL BOMBS FOR DISPENSING INSECTICIDES

One of the things we like to talk about is the development, a Bureau invention, of the aerosol which has been very helpful in the control of numerous species of insects and we brought along a couple of aerosols. Here is the one used by the Armed Forces during World War II. They were handled exclusively by the military. Some 35 million units similar to that were purchased by the military during the war. Following the war, the aerosol principle of using liquefied gas as a carrier for insecticides, became available for civilian use. It is growing into quite a substantial business, Mr. Chairman, and while I am not seeking to advertise this particular make, this is one of a number of different kinds that are now on the market.

Mr. HORAN. Do you have a public patent on this?

Mr. HOYT. Yes, sir; there is a public patent on this and there have been some 89 nonexclusive licenses, I believe, issued by the Secretary of Agriculture for the manufacture of these aerosols. There was in the last fiscal year, in 1952, 30 million of this size aerosol manufactured and sold. The average price is about $1.25 a piece. So you can see

it has become quite a substantial industry. In addition to that, the principle is being used in a number of other ways. They use it for dispensing shaving cream, deodorants, perfumes, whipped cream, and numerous other items. There were some 60 million units of that kind processed in the last year.

LICENSING OF PESTICIDES

Mr. HORAN. Dr. Clarkson, will you consult with the Secretary of Agriculture and find out why the Bureau of Entomology and Plant Quarantine should not be the licensing bureau for pesticides?

Mr. CLARKSON. I can do that, Mr. Horan.

Mr. HORAN. It is possible there are good reasons why they should not be, but will you discuss it with him? Since I was a member of the special committee that dealt with this problem, I feel the Department of Agriculture should license pesticides and their use. I think that the folks who have to work with them should have an additional responsibility in that regard, and we are going to have legislation proposed that may affect the situation. Since I have been in touch with this whole field, I am very, very interested in knowing the Secretary's reaction as to why Mr. Hoyt's division should not have the added responsibility of licensing this stuff for use, knowing as they do, from pear pscylla to San Jose scale, all down the line, since you folks have to deal with the possibility of enabling farm products to be commercially acceptable, I would like to know why you should not have the primary responsibility of licensing pesticides.

BIOLOGICAL CONTROL OF INSECTS AND NOXIOUS WEEDS

Mr. HOYT. Another problem that we have been working on is the question of biological control. What you have been saying, Mr. Chairman, bears out exactly the problem that confronts us, that insofar as it is possible to use a bug to attack a bug, we can get away from this insecticide problem and all that goes with it.

Mr. HORAN. Natural enemies.

Mr. HOYT. We have never made an adequate exploration of that field. It is time that it was done because as the insecticide problem develops to greater and greater proportions, it would be very desirable if we had more information on what can be done in the field of natural control.

Mr. HORAN. The subcommittee may be interested to know that there are people out in the apple growing area who go up in the forest and collect colonies of lady bugs and sell them to growers who turn them loose in the orchards. They attack aphids, the Willy and Rosy and other aphids. There are several varieties of aphids and the ladybug does destroy the aphids. That is what you are talking about.

Mr. HOYT. We feel that it is urgent to pursue that as rapidly as we can.

PROBLEM OF INSECTS ATTACKING STORED PRODUCTS

Another problem is in the field of insects attacking commodities while in processing, marketing, and storage stages. Many agricultural products are held with or without processing for substantial periods of time, and the problem in dealing with this is one which you have men-

tioned here a while ago—the question of contamination—food products can become contaminated through the presence of insect parts or through the presence of residues of insecticides that have been used to destroy the insects so that we have to deal with the problem of contamination and of the control of the insects that destroy the stored products. We have been giving a good deal of thought to that particular problem. We understand from the records that during the last half of 1951, for instance, there was an average of 23 tons of food products seized every working day. That probably would compare with the figure that you used in discussing the same question a few moments ago.

Mr. HORAN. Does that apply to both imports and exports?

Mr. HOYT. I do not know as to whether this figure would be—I take it it does—there has been that much seized in this country.

Mr. HORAN. In behalf of the interests of the area that my colleague from Minnesota and my colleague from Wisconsin represent, I want to say this: It is the opinion of myself, and I think of the subcommittee members present, that in our administration of cheese-making we have a double standard. We are completely the disciplinarian when it comes to domestic products, producers of cheese, yet we shut our eyes when it comes to the importation of other cheeses from other countries. What we do not want to do, Mr. Hoyt, is to be too rigorous on our own domestic producers and be too generous when it comes to the production principles and regulations that apply to producers in other countries. I think it is a field that interdepartmental discussion should occur on, perhaps at the Cabinet level. How tough we can get with our own folks at home, and how liberal we can get when it comes to foreign producers.

Mr. LAIRD. I would like to state that this is particularly true in the production of the milk that goes into the foreign cheese and other foreign dairy products.

Our dairy farmer is put at a disadvantage on a price basis with foreign imports, primarily because of the sanitation production standards in this country. I approve of the standards but they certainly increase our production costs. The dairy farmer has recently been required to make a considerable investment, under the milk production improvement program, in milk houses and equipment. He produces his milk with a much higher labor cost. Further requirements of brucellosis and tuberculosis control programs protect the consumer and farmer but do add to the cost of production. Since World War II this country has helped rebuild the dairy industry abroad to a point where production so exceeds demand that it was possible in 1952 for them to export some 40,000,000 pounds of dried whole milk and buttermilk to the United States. This is the equivalent of approximately 304,000,000 pounds of whole fluid milk. Certainly we should not continue to use the agricultural support program to take care of these foreign surpluses of milk, cheese, or butter. The original milk is produced under unsanitary conditions abroad, as compared with our standards.

Mr. HOYT. In connection with cheese we brought along a picture or two we are going to show you in a few moments in connection with the cheese situation.

Before we leave this particular phase of it, I want to show you a specimen illustrating problems of resistance of insects to insecticides. Of course, you have been hearing about it. Insects are developing a marked resistance to insecticides. We brought some of the newly found resistant cockroaches.

Mr. HORAN. How many life cycles do cockroaches have?

Mr. HOYT. It varies by species. But all of them have a good many in a relatively short period of time.

This is the resistant cockroach in this jar. It is in a jar that has 64 times the dosage of the insecticide as this other jar has but because it has built up a resistance to the insecticide these roaches are still living and are apparently unaffected, whereas the roaches in this other jar which have not built up their resistance are all dead with a much smaller dose.

Mr. HORAN. Can't you kill cockroaches with parathion if you sprayed a building with it?

Dr. BISHOPP. It will kill them, but it is too dangerous to use in habitations.

Mr. HOYT. You can clear it out when you fumigate a building. Under those circumstances, it might be practical but it would have to be surrounded with some very great precautions.

Dr. BISHOPP. May I interject one statement on that? This is simply one example of the extent to which resistance can be developed in a relatively short time. We are having resistance show up in many instances. For instance, the common cabbage caterpillar and spider mites are showing marked resistance to DDT.

Mr. HORAN. And the codling moth.

Dr. BISHOPP. The codling moth showed resistance to arsenicals years ago. We have that showing up in many different places. The housefly gave us the most striking example. Through the general use of DDT this insect was practically eliminated but now they are coming back in considerable numbers and giving us real difficulty to control them satisfactorily.

Mr. HORAN. That is due almost entirely to the fact that a strain in an insect colony that can resist the insecticide continues to multiply, so by the end of the year, where you have 2 or 3 life cycles, you almost have a complete new family of insects which are resistant to that insecticide.

Dr. BISHOPP. I think that is quite true.

Mr. HORAN. That is what you have demonstrated here with these cockroaches.

Dr. BISHOPP. The ones that are resistant continue to flourish.

Mr. HORAN. Let us follow this clear through. We expect the Department of Agriculture in cooperation with the land-grant colleges and experiment stations and in cooperation with insecticide producers and the chemical industry, to develop pesticides that will control what is left of the immunized insects that attack what we produce and present to the American consumer. That completes the cycle of our responsibility, I hope. If you have anything to add, Dr. Bishopp, I hope you will.

Dr. BISHOPP. I would like to say that we are cooperating closely with many of the agricultural experiment stations and universities. Also, with the military in the development of new insecticides that may accomplish destruction of given pests without undue residue or health hazards. It may be of interest to the committee to know that the military has been strongly behind fundamental work on this problem. It would, perhaps, be more logical for the Department of Agriculture to do most all of the fundamental work on this problem because we have had for years, here in the United States, an organization dealing with the insect world and have the personnel and the facilities, the know-how to meet these problems. I think we will make very marked advances in the next few years through intimate study of the physiology of the various species of insects and how the resistance actually comes about, and how we may block the development of resistance or through our insecticide studies develop materials that may be more effective and may not have this tendency to build up resistance among the insects.

PROBLEM CAUSED BY THE PINK BOLLWORM ON COTTON

Mr. HOYT. Before I pass on to what we have been doing about some of these problems, I want to discuss problems caused by the pink bollworm on cotton. The situation continues to be serious on that insect. There was additional spread in the last year. We have a map here to show the present situation, so that you can have in front of you the picture with respect to the spread of the pink bollworm as it is today.

Mr. HORAN. Mr. Whitten, if there is any question you want to ask after Mr. Hoyt has completed that part of his statement, I wish you would.

Mr. HOYT. Here is a Riker mount that shows the pink bollworm and the way in which it works. The effect on the cottonseed. The boll at the left is not infested. You can see that one uninfested boll fills a space of the same size that it takes about 15 infested bolls to fill on the other side of the mount. Also note the differences between the infested and uninfested lint and the differences in the seed.

Our control of pink bollworm was based primarily on cultural methods and it seemed to be very satisfactory. We had a number of years in which there was no particular spread and the result was——

Mr. HORAN. Does this occur in California?

Mr. HOYT. No, sir; it does not.

Mr. HORAN. They do not have it there.

Mr. HOYT. They do not have it in California. However, it could become a very serious pest in California. In cooperation with the boll weevil, it makes a bad combination for the cottongrowers because the boll weevil likes wet seasons and is most destructive in more moist seasons whereas the pink bollworm can do just as good a job in dry seasons; so the grower, if he has both to contend with, does not get any relief from the weather.

Our control program was based on cultural methods including the prompt destruction of the crop residues after harvest, so that we had

what amounted to noncotton season from then until the planting time the next year. But for several reasons in south Texas, several years in a row we had weather that was unfavorable to that type of program and was favorable to the development of the pink bollworm. As a result we have had a wide spread. It has now covered the State of Texas. It is at the door of Arkansas. It is in southern Oklahoma. It is in several parishes in the State of Louisiana. It is a disturbing picture.

Mr. HORAN. I notice that you have about five counties in Louisiana that have heavy infestation.

Mr. HOYT. The infestation in Louisiana is not heavy in comparison with what we term heavy. Pink bollworms have been found in gin trash and in the fields in some parishes there as represented by the yellow color.

COOPERATIVE PEST-DETECTION AND REPORTING SERVICE

We have proceeded with the organization and launching of an insect-pest detecting and reporting service which is operating now in every State. The purpose of that is to help us first to foresee the increasing populations of destructive insects in the area so that appropriate action can be taken before it gets too serious. In that problem we have gotten the help of every entomologist in the country. It is an entomological program where all entomologists and others cooperating in the program are going to make observations, and we have provided channels through which they could report their findings so that in each State the State officials—that would be the State experiment station, the extension service, and the State department of agriculture—have agreed on one central office to which any comment or observation or specimen will be sent. That information is sent to Washington, and we get out during the season a weekly report on the findings.

STATES IN POSITION TO ACT IMMEDIATELY

The State, of course, has immediate use of the information as soon as it is developed. It does not have to wait while it comes to Washington. We have had 1 year now of working on that, and we believe it is going to be a very effective weapon against the buildup of some of these destructive outbreaks such as we have had in the past.

Mr. HORAN. Does that involve quarantine?

Mr. HOYT. Not necessarily, but it could. It involves the application of suppressive measures, whatever may be indicated, depending on——

Mr. HORAN. Usually at the point of assembly, the mill or the gin.

Mr. HOYT. Yes, sir; wherever it may be found. But this detection and reporting service is not limited to pink bollworm. This is a cooperative service which is operating over the whole country, 48 States.

Mr. WHITTEN. Mr. Chairman, in this connection, as you have pointed out, we have had this Bureau investigated and hope as a result we have it on a good basis.

I do think that now you are getting around to meeting your problems. However, there is still one thing that I want to develop. I would like to have in the record a listing of the problems that your Bureau deals with, showing the annual damage to crops from each of the major sections, the amount of Federal money spent in control programs, the amount of money contributed for each program by States or local interests.

Mr. HORAN. And by private individuals.

Mr. WHITTEN. Separate State contributions and private contributions. Then I would like to show how much we spend in research in the Department for that same program where there is a comparison between control programs and the research.

I think the records through the years support the view that if perhaps through research, we had a better answer we might have saved lots of money. Last year this committee at my urging included in its report a directive that, where further research was needed beyond that provided in the bill, the funds should be taken away from control programs to do it.

We are not trying to reduce efforts in the control programs, but if we are not giving proper attention to getting a better answer we feel that there should be a transfer of funds from control programs to research. I bring that up because I understand that, as vital as this pink-bollworm problem is, to meet it scientists who were dealing with boll weevil and other insects in the cottonfields were transferred to it, and other research projects were reduced. Yet, in the action of the Congress, you were told to meet those research tests first and reduce your control program cost slightly if needed. When you get to it, I want to know why that was not done and what is going to be done along that line.

Mr. HOYT. We will be very glad to furnish that as fully as we are able to do, Congressman Whitten.

Mr. WHITTEN. Some of it is bound to be an estimate, we recognize, Mr. Hoyt.

(The information requested is as follows:)

LOSSES DUE TO SEVERAL IMPORTANT PESTS AND ESTIMATED EXPENDITURES FOR CONTROL AND RESEARCH

In response to a request by the committee, information is given in the following table regarding losses due to several important pests and estimated expenditures for research and control. Accurate information is available on the amount of funds for control work provided by States, municipalities, and individuals on the 11 insects and plant diseases now receiving attention. Information as to the amounts that States, counties, municipalities, private industry, and individuals are spending for research on major insect pests is not available.

In explanation of the loss or the estimated damage to crops, it must be recognized that in most instances losses are extremely difficult to determine because of the factors that enter into such a determination. Losses from given pests vary widely from year to year and from area to area. In many instances the damage inflicted by one pest is confused by the presence of other pests, adverse weather conditions, etc. Furthermore, insect damage may be of an obscure nature such as that

inflicted by soil insects which affect the normal development of the plant or from insects that do not destroy the plant but reduce the yield in an intangible way by transmitting a virus or other disease, or otherwise reducing the quantity and quality of the crop.

It will be noted that the estimated damage caused by insect pests and the amount of Federal funds expended on research and control are not consistent when the various relationships are examined. The small amounts devoted to research on given pests may be due to the availability of effective control methods, the fact that State or other agencies are carrying forward aggressive research programs, the tendency of certain pests to recur in serious abundance only occasionally, the outlook for development of an effective control in a reasonably short period and numerous other factors.

Although only 46 insects and diseases are listed in the following table, there are many other pests that are producing serious crop losses, either annually or occasionally. Some of these are receiving attention from State agricultural experiment stations or other local agencies but many are in need of further attention.

It has been estimated that the total annual loss chargeable to insects in the United States is in excess of $4 billion. It must be recognized that a certain amount of this loss is inevitable regardless of the effectiveness of control measures available, but it appears certain that this loss figure can be materially reduced with the development through research of effective and economical control measures and their more complete adoption by farmers and others.

Pest [1]	Estimated damage to crops [2]	Estimated obligations for control, fiscal year 1952			Estimated Federal funds spent in research, 1952 [6]
		Federal Government [3]	State government [4]	Other [5] (county, township, private industry, and individuals)	
Japanese beetle	(7)	$500,947	$373,008	[8] $40,216	$122,800
Sweetpotato weevil	$5,031,000 (1944)	238,069	444,906		7,000
Citrus blackfly and Mexican fruitfly.	(9)	256,020	32,400	[10] 1,176,646	133,200
Phony peach and peach mosaic	$1,594,000 [11]	158,834	70,662	643,696	32,600
Wheat stem rust (barberry eradication).	$28,000,000 (1915–51) [12] $10,000,000 (1939–51) [12]	674,224	238,050	54,475	[13] 91,000
Pink bollworm	$28,195,000 (1952)	1,237,252	180,550	[14] 62,000	102,400
Golden nematode	(15)	311,897	150,500		22,000
White fringed beetle	(16)	703,740	167,314	[16] 458,452	35,900
Hall scale	(15)	108,245	11,127		
Gypsy moth	(17)	584,948	725,412	686,552	[18] 1,000
Grasshoppers and mormon cricket.	$30,000,000 [19]	630,564	81,000	[20] 238,035	91,300
European corn borer	$77,205,000 (1952)	45,999			109,900
Chinch bug	(21)				1,000
Greenbug	$75,800,000 (1950)				37,700
Hessian fly	$37,000,000 (1943)				31,800
Sugarcane borer	$6,412,000 (1938)				32,300
Wheat-stem sawfly	$17,000,000 (1952)				91,400
Beet leafhopper	$11,608,000 (1944)				50,600
Mexicanbean beetle	$5,502,000 (1944)				6,500
Tobacco hornworm	$84,073,000 (1944)				19,400
Wireworms	$40,000,000 (1938)				43,700
Onion thrips	$14,500,000 (1944)				8,600
Cabbage caterpillars	$13,096,000 (1944)				4,900
Aphids on potatoes	$66,467,000 (1944)				37,700
Pea aphid on peas	$3,969,000 (1944)				35,600
Cotton boll weevil	$200,000,000 [13]				45,800
Cotton bollworm	$100,000,000 [13]				21,400
Lygus bugs	$15,800,000 (1944)				1,200
Coddling moth	$9,176,000 (1952)				11,900
San Jose scale	$7,380,000 (1938)				2,000
Clothes moths and carpet beetles.	$500,000,000				22,000
Horn fly	$100,000,000				5,400
Screwworm	$15,000,000	29,717			22,700
Cattle grub	$160,000,000				24,800
Lice of cattle, sheep, goats, and hogs.	$50,000,000				7,800

See footnotes at end of table, p. 824.

Pest [1]	Estimated damage to crops [2]	Estimated obligations for control, fiscal year 1952			Estimated Federal funds spent in research, 1952 [6]
		Federal Government [3]	State government [4]	Other [5] (county, township, private industry, and individuals)	
Poultry lice	$7,000,000				$1,500
Engelmann spruce beetle (Colorado-Montana).	(22)				20,000
Douglas-fir beetle (Idaho, Washington, Oregon).	(22)				11,000
Western pine beetle (California).	(22)				30,000
Mountain pine beetle (Montana).	(22)				13,000
Black Hills beetle (Colorado-Utah).	(22)				4,000
Spruce budworm (Oregon, Washington, Montana, New England).	(22)				155,400

[1] This list of pests includes some of those major forest insects the control of which is financed from appropriations under the Forest Pest Control Act, data on which are included in the record on the hearings on that appropriation.

[2] Because of the difficulty and cost in determining damage resulting directly or indirectly from insects, amounts in this column represent approximations based on the best data available.

[3] Represents obligations in fiscal year 1952 from appropriated funds.

[4] Represents amounts appropriated for 1952 by States directly for the project being conducted, or the best estimate of funds spent for this work when included in a general fund for insect and plant disease research or control.

[5] Represents the estimated value in 1952 of furnishing such items as, (1) laboratory and office space, (2) technical services and labor, (3) insecticides, (4) travel costs, (5) equipment, (6) storage, (7) plots, and other facilities for conducting formally organized control programs.

[6] Information on amounts available for State or local entomological research is not available.

[7] Estimated damage to farm, field, and orchard crops in the 16 infested States approximates upward of $10 million annually. As a result of an effective regulatory and control program spread has been limited to about 6 percent of the land area of the country which is subject to infestation.

[8] In addition, several million dollars are expended annually by nurserymen within infested areas in order to meet regulations governing movement of nursery stock, by railroads and other common carriers likely to carry infested material and by private owners and others in the application of insecticidal and biological methods of control on an organized community basis.

[9] Damage in United States is negligible as current programs are designed to prevent, and so far have prevented, these pests from becoming established in citrus areas of the United States. These pests are principally found in Mexico.

[10] This is principally contributed by the Government of Mexico.

[11] Represents loss of crop due to diseased trees in spite of control work in progress.

[12] Average.

[13] Cultural practices and breeding for resistance.

[14] In addition approximately 2,000 cotton gins have installed equipment valued at $2,000 to $3,500 per unit to treat cottonseed to prevent spread of the pink bollworm. Approximately 117 oil mills in certain areas have also installed special equipment ranging in costs from $50,000 to $150,000 per unit in connection with this program.

[15] Losses in this country negligible due to limited distribution and effective quarantine and control programs.

[16] This does not include costs incurred by nurserymen, farmers, railroads, and other public carriers in complying with regulations to prevent spread.

[17] By confining this pest to New England and eastern New York losses have been greatly minimized. In severe outbreak years however upward of 1 million acres of trees have been defoliated.

[18] Sound and economical control methods have been developed; present research confined to occasional tests of a new insecticide.

[19] Losses in outbreak years have exceeded $100 million. However, due to highly effective control measures available to farmers, losses on cropland have been substantially reduced in the last few years. On rangelands it is economically feasible to apply effective control measures when the infestation threatens epidemic proportions.

[20] Nearly $2 million additional annual cost was assumed by farmers when highly effective and economical controls of these insects became available.

[21] Losses varied widely from year to year. Annual damage has amounted to more than $50 million when occasional widespread outbreaks occurred. No serious outbreaks have been experienced for several years. There are signs this year, however, that chinch-bug populations are increasing. At present the research is confined to developing resistant varieties. This work is incidental to other projects.

[22] Damage in present epidemic areas is included with data in the record on the hearings under the Forest Pest Control Act.

Mr. HORAN. In your justifications, of course, you have covered the research problem.

Mr. HOYT. Yes, sir. But I think Mr. Whitten would like to have a discussion of this particular point that he has raised.

Mr. WHITTEN. The particular point affects my area but it is illustrative of a broader problem. We gave you the authority to solve it and the authority was not fully used.

Mr. HORAN. In doing that, Mr. Whitten, you would not object to having some discussion of the Oscar Johnston Cotton Foundation?

Mr. WHITTEN. I shall be glad to have that. I think the pink bollworm problem is a major one. The Oscar Johnston Foundation and the National Council cooperated with the folks when they made this study. This is one of the better examples of local and private cooperation. I think the records show that the State of Texas and other States and private sources contributed $6, $7, $8, or as much as $10 for each Federal dollar which is not true in any other control program of which I am aware. Nevertheless, territorial controls are good but usually a better answer is needed. We want to be sure that we do not weaken research in order to carry on a little more control. In other words, we feel that you should cut your control money down slightly if need be to be sure that you have adequate scientists trying to find the more perfect answer.

Mr. HORAN. Can you talk to that point?

Mr. HOYT. I would like to, right now.

Mr. WHITTEN. I would like to put in at this point the appropriate part of the committee report of last year.

Mr. HORAN. We will be glad to have that.

TRANSFER OF FUNDS FROM CONTROL PROGRAMS TO RESEARCH ACTIVITIES

Mr. WHITTEN. I would like to read it into the record. It appears at page 7 of the committee report of last year in these words:

> The Secretary has authority to transfer funds between appropriation items where necessary to meet urgent needs. In view of the large amounts being expended each year on programs to control and eradicate insect pests and the value of the crops destroyed each year, the Department should transfer additional funds from the control programs to the research activities where such action will result in reduced expenditures for insect control and eradication in the future.

Of course, you must be of the opinion that it is to the best interests of the program; but we clearly demonstrated where the opinion of the committee and the Congress was.

Mr. HOYT. If I may go into a discussion of that now, may I refer to a memorandum of July 31, 1952, from me addressed to the Secretary of Agriculture on this subject? I quoted another paragraph, the one preceding the one you just read from the same report you just mentioned. However, I would like to provide additional background information on this problem first.

We transferred $30,000 from other research items to pink bollworm research and stipulated to the Division of Cotton Insect Investigations at that time that they should provide a comparable amount in the form of manpower or any way they were able to do, which made a total increase amounting to $60,000 a year for increased emphasis on pink bollworm research. We reported that to the committee at the appropriate time and, as you have pointed out, Mr. Whitten, that drew away from general cotton insect research to the extent of $30,000 worth of manpower and supporting expense funds. Trained men were transferred to this specific problem of pink bollworm research on the basis that with the then rate of spread of pink bollworm if we did not get more effective controls, we were going to have to deal

with it on a nationwide basis the same as we are dealing with boll weevil.

Mr. HERRELL. That adjustment of research funds was made in 1952 fiscal year before we had this direction of the House committee concerning the transfer of control funds to research.

Mr. HOYT. Yes, that was done in 1952. We reported it to the committee that year and the committee that year in its report included the language that you have called attention to.

Then in August 1952—in the fiscal year 1953—pursuant to the direction in the House report, from which you just quoted, Mr. Whitten, the secretary's office approved the following memorandum authorizing the transfer of $73,000 from control funds to research:

The House report on the Agricultural appropriation bill for 1953, page 7 states in part as follows:

"The committee recommends the full budget estimate for insect investigations and research, in view of the urgent need to develop more effective means of controlling the many pests for which we are spending large sums for control and eradication programs. Increased attention must be given to methods for eliminating new races of wheat rust which stem from barberry bushes. And such destructive pests as the pink bollworm, the European cornborer, the citrus blackfly, and the white-fringed beetle, each of which destroys crops each year worth many times the amount of funds involved here, must be brought under control through further research on improved control techniques.

"The Secretary has authority to transfer funds between appropriation items where necessary to meet urgent needs. In view of the large amounts being expended each year on programs to control and eradicate insect pests and the value of the crops destroyed each year, the Department should transfer additional funds from the control programs to the research activities where such action will result in reduced expenditures for insect control and eradication in the future."

The authority for transferring funds referred to above is contained in section 702 (b) of the Department's 1944 Organic Act.

Urgent problems exist in two fields of research where funds, in addition to those currently available, are needed. These problems are discussed below:

RESEARCH ON COTTON INSECTS

For the past 3 years we have been losing ground in preventing the spread of the pink bollworm. During 1952 research was stepped up considerably by transferring funds from other planned research activities in an endeavor to find more effective methods of controlling this insect. The problem is a continuing one, and it is estimated that an amount of $35,000 in addition to that currently available is needed to continue and expand research on cotton insects, principally the pink bollworm.

BEE CULTURE AND BIOLOGICAL CONTROL

There has been considerable success in recent years in employing biological means to control injurious insects and obnoxious weeds. Examples are the work on oriental fruitfly, the Klamath weed, and indications point to considerable likelihood of success in controlling the cornborer. We are currently exploring the possibility of importing parasites to control the beet leafhopper in the Western States, parasites that might breed on the weed called "halogeton," and a representative of the Bureau is now abroad searching for parasites that may be helpful in the control of the pink bollworm.

The field of biological control is one from which it is believed a small expansion at this time might prove to be of great advantage in controlling a number of hazardous plant pests. Industry is doing much research work on insecticides and chemical means of controlling insects, but only the Federal and State Governments assume responsibility for the natural control methods. An amount of $38,000 in addition to that already available for this work, would make it possible during 1953 to expand research along this line on a minimum basis.

In view of the possibility that expanded research along the lines indicated may decrease control costs, it is requested that a total of $73,000 be transferred from "Salaries and expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, insect and plant disease control," to "Salaries and

expenses, Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, insect investigations," for the current year to be made available for the purposes stated above.

The decrease under the subappropriation "Insect and plant disease control" has been spread proportionately by all projects with the exception of Hall scale and insect detection and advisory service, where increases above the budget estimates were determined to be necessary.

The "control" funds proposed for transfer are needed and would be used for control programs except for the more urgent need for the proposed research.

We are proposing to make this transfer for the current fiscal year only. During 1954 and subsequent years we would finance continuing costs of these activities by adjustments we plan to make in our current research activities.

Mr. HOYT. We have a man now in Egypt who is looking for insect enemies of the pink bollworm so that we did take some steps in the direction authorized by the committee.

Now, to go very much further than that seemed to us unwise because we were in this position on our pink bollworm problem: we were under demands from every State around the periphery of that infested area—they would say "You have got to protect us; you can't pull any of the inspectors away who are protecting us." We are now under fire from the Southern States insisting that we must put additional inspectors somewhere along the line of the Mississippi River.

Mr. WHITTEN. I want to say this, Mr. Hoyt. By raising this problem, I do not mean to substitute my judgment for yours. I do want to urge again that our subcommittee include in its coming report this same language because then, where the Bureau and the Department think it is wise, it gives our tacit approval to making such changes.

FINANCIAL SUPPORT OF THE OSCAR JOHNSTON FOUNDATION

Mr. HOYT. What we are doing on that, Mr. Whitten, to continue that just a little bit further, the Oscar Johnston Cotton Foundation has made $35,000 available for our use in stepping up pink bollworm research. At the time we made that first transfer we were spending about $50,000 a year on pink bollworm research. We increased that through our own efforts to $115,000. We now have $35,000 from the Oscar Johnston Cotton Foundation, making a total of $150,000 that is being spent on pink bollworm research at this time. We have a man in charge of that particular activity. We are enlarging our laboratory facilities which will probably be centered in Brownsville, Tex., where they have plenty of material to work on and we are setting up as complete a program of research on that insect as we can.

DAMAGE BY THE PINK BOLLWORM

Mr. WHITTEN. Approximately what was the damage caused by the pink bollworm?

Mr. HOYT. Until last year, it was almost impossible to find any measurable damage in the United States, but last year, that is the 1952 season, in 39 counties in south Texas, they reported estimates of damage to the extent of $28 million.

Mr. WHITTEN. That was only 39 counties, and if it were to spread completely across the belt, it is hard to estimate the total amount of damage it would bring about.

Mr. HOYT. Yes, sir. In the first place, as the insect has spread, it has been under exceedingly severe suppressive conditions so that the amount of damage that it is capable of doing really has not been demonstrated. This is the first time that we have had occasion to have measurable damage.

Mr. WHITTEN. You have had huge damages before but this is the first time you have tried to——

Mr. HOYT. To really get out and measure it.

Mr. WHITTEN. To determine how much it was.

Mr. HORAN. What are the plans for the laboratory?

ADDITIONAL LABORATORY FACILITIES FOR PINK BOLLWORM STUDY

Dr. BISHOPP. I think it would be of interest to the committee to know that a very well constructed building—not elaborate but meeting the needs of research on this pink bollworm problem—is being provided through private funds. They are building the building for us at our specifications on federally-owned land under a use permit to the Southmost College and then we are agreeing to pay rental to amortize that cost and——

Mr. HORAN. What location?

Dr. BISHOPP. In Brownsville, Tex. Then, after the original cost is amortized under standard Government regulations, the rental will be dropped to a nominal sum to maintain it. Up to now, we have had no adequate facilities for fundamental research on pink bollworm. We have a man at College Station, Tex., where they are carrying on work in connection with the State experiment station there.

Mr. HORAN. Approximately where is College Station, Tex?.

Dr. BISHOPP. It is in south central Texas. The pink bollworm is now all over the State so we are in that territory but we are still handicapped to carry on work there because of our suppressive measures. We do not want to give the impression or actually do not want to carry too many pink bollworms northward out of this old infested area.

COOPERATION OF MEXICO

Mr. HORAN. What work is Mexico doing on the pink bollworm?

Dr. BISHOPP. They have been cooperating very fully with us in carrying out some of the earlier cultural control programs aiming toward uniform planting of cotton and the uniform early destruction of the stalks which is the most essential thing.

Mr. HORAN. Then they are cooperating?

Dr. BISHOPP. Very well. But in the last 2 years, as Mr. Hoyt has indicated, they have had very adverse climatic conditions, no rain in the winter and spring so they could not get the crop started off early. A lot of cottonseed was planted in dust so that it lay there dormant for months before it came up. That is what has disrupted that whole line of cultural control.

Mr. HORAN. That is another reason we have had this spread, apparently. What effect does climate have on the pink bollworm? Are there indications that it can thrive in more northerly climates?

Dr. BISHOPP. Yes. Information from various parts of the world where the pink bollworm has been present is that it may thrive in any part of our Cotton Belt. Undoubtedly it will be more destructive in the warmer portions of the Cotton Belt; that is, the southern portions. Just what it will do in extreme northern portions of the Cotton Belt is not well known. It does seem to be adaptable to quite a diversity of climatic conditions. Even in China—farther north, latitudewise, than much of our cotton-growing areas—the pink bollworm has been very destructive, has had a very serious effect.

Mr. WHITTEN. This governmental control program is way ahead of most of them due to the arrangements whereby local people in the States pay by far the larger share of the costs.

PINK BOLLWORM SITUATION IN TEXAS

When we first started investigating control programs, the Department was unaware of what the law was in various States. We had to have a survey made to find out what the States were doing to help. That was not true with regard to the pink bollworm but with regard to many others. We finally found that out. One of the problems we have is that States have proper laws but on occasion neglect the enforcement of them. What is the attitude of the State of Texas with regard to carrying out the Texas law which requires the turning under of cotton stalks at an early date, and things of that sort? Are they cooperating fully now in these control measures?

Mr. HOYT. One has to take into account the conditions under which they have had to work. Weather conditions and numerous other factors have influenced this whole situation.

It was difficult to set a date for closing the planting time exactly when it should have been and accordingly there was delay in a deadline for plowing under the crop residue in the fall. We had several years of that, so that instead of getting some of those stalks under as early as September 1, we did not get them under until the latter part of November, which meant that the damage had been done. The pink bollworm had had at least one more generation under their optimum conditions, with an enormous buildup.

Mr. HORAN. Is there anything that this subcommittee can do in a case like that?

Mr. HOYT. We have splendid cooperative relationships. I do not think we were unreasonable and I think the State was always very friendly and cooperative. We had one of the best clean-ups in the fall of 1952 that we have had in a number of years. There has been an enormous destruction of pink bollworms during this winter but when you have so many millions, we are not too hopeful about what this season may have in store. From a cooperative standpoint, our criticism of Texas at this time is that the Texas State Department of Agriculture does not contribute as much money to the program as it should. They are not putting in the manpower. They are giving us moral support and the authority of the State is thoroughly behind the program.

We have a chart here showing the effect of early community control of cotton insects which I believe will be of interest to the committee.

Mr. WHITTEN. I think we are entering into better days so far as the control of pink bollworm is concerned. However, some States are as yet not troubled with this infestation in spite of the fact that it threatens the rest of the country. Unfortunately, these States not affected do not see its seriousness as readily as they do the problems which are already with them such as the boll weevil and various other pests. The question arises, then, as to whether, in trying to stop as major a thing as the pink bollworm problem, it should be done by taking people off other research problems or work and putting them here, or whether it should be by reduction in the control program. That is the problem that I raised awhile ago. In the final analysis, your Bureau is going to make the determination and I am not trying to substitute my judgment for it but I do want you to understand my concept of the problem.

Mr. HOYT. In view of the fact that the Oscar Johnston Cotton Foundation is supporting this program financially, they have discussed with the States, in the principal cotton-growing States, the desirability of those States putting money and effort into the pink bollworm research program. I attended a meeting of the directors of the experiment stations of the Southern States recently in which they are seriously discussing this matter. They asked us the question: "What could they do with that money, within boundaries of their respective States, that would most contribute to pink bollworm control program and our pink bollworm research program?" And our reply was that they could finance the cotton insect research that we had reduced at the time we transferred men to strengthen the pink-bollworm research; that would be a very effective form of cooperation and would benefit them and would benefit the total program.

Mr. WHITTEN. I hope they will fully cooperate along that line. I want to repeat, however, that in case you fail along that line it is still the feeling of the committee that if need be you should divert control money to what you determine to be a serious research problem.

Mr. HOYT. I have here a map which shows the pink bollworm situation. Here is a chart that shows the research results in increasing cotton production through early community control of various cotton insects.

Mr. HORAN. This shows the attitude of communities, I assume, in attacking their own problem.

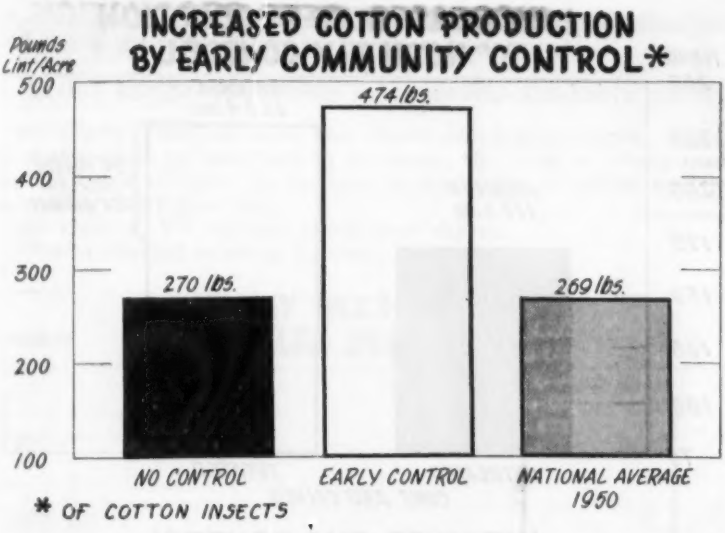
Mr. HOYT. Yes, sir.

Mr. HORAN. We will get nowhere unless we have that. If the community resists either the State or the Federal controls measures, it is not good.

INCREASED COTTON PRODUCTION BY EARLY COMMUNITY CONTROL

Without objection, we will insert this chart in the record at this point.

(The chart is as follows:)



Mr. HOYT. You can see what happens when they get together and really put on the program. You get a crop production there of 474 pounds of seed cotton per acre compared with 270 pounds where no control was used on the test plot which is also close to the national average.

Mr. HORAN. May I close this pink bollworm discussion unless there are more questions. It is hoped that local communities and State governments will cooperate completely with the Federal Government in the field of research and control——

Mr. WHITTEN. I do not mean to belabor the issue, but in spite of all the problems that have been mentioned here in this particular program, it is almost 500 percent better than you have in most other control programs, both on money contributed, cooperation, and all the rest, judging by the testimony before us in the past. So I want your comment to apply to the whole problem.

Mr. HORAN. I will comment in this way: I have lived through pear psylla quarantine of about 20 years and I know exactly what you mean.

Mr. HOYT. We have another chart or two here to show the effect of the use of insecticides in the production of some other agricultural commodities.

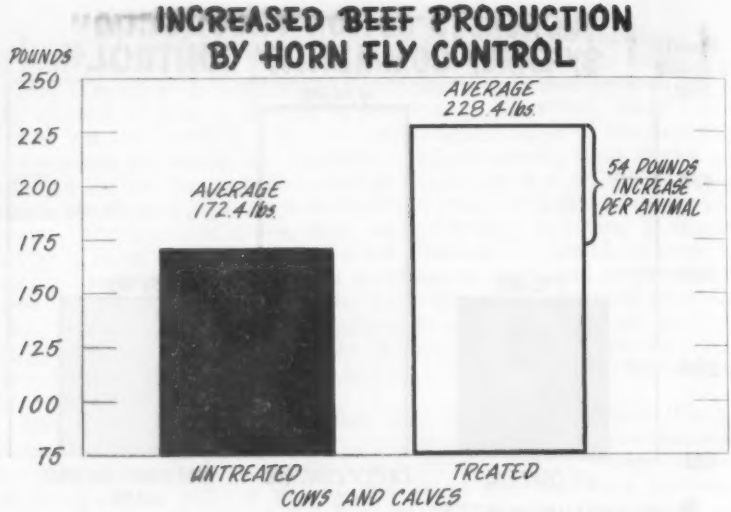
INCREASED BEEF AND MILK PRODUCTION THROUGH FLY CONTROL

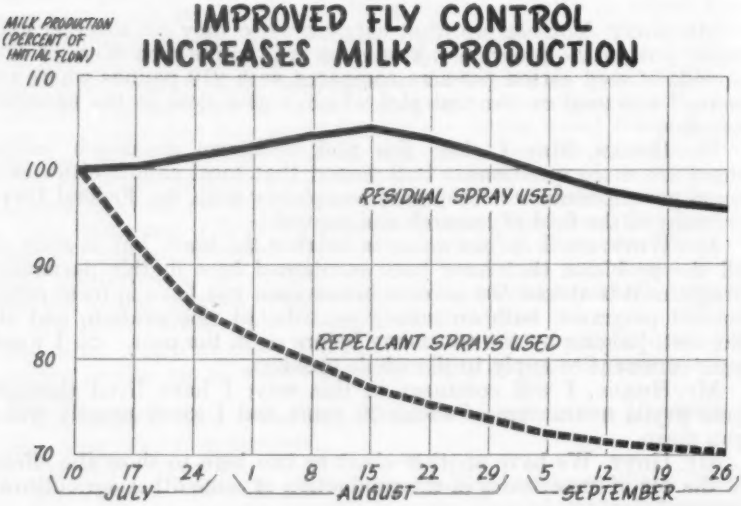
The first chart shows the increase in beef through the use of insecticides for hornfly control. I believe it speaks for itself.

The second chart shows the effect of fly control in dairies on milk production.

Mr. HORAN. We will insert these charts in the record here.

(The charts are as follows:)





Mr. HORAN. Are we getting away from these sprays?

Mr. HOYT. So far; yes.

Mr. HORAN. I thought they cut out DDT on cattle.

Mr. HOYT. That is true. They are using substitute materials, getting good control, and are getting a substantial increase in production.

Mr. HORAN. It has been a long-known fact that you get more milk from contented cows. Of course, sprays helped that.

Dr. BISHOPP. We have three safe materials for use on dairy animals. These are methoxychlor, pyrethrum, and allethrin which are very

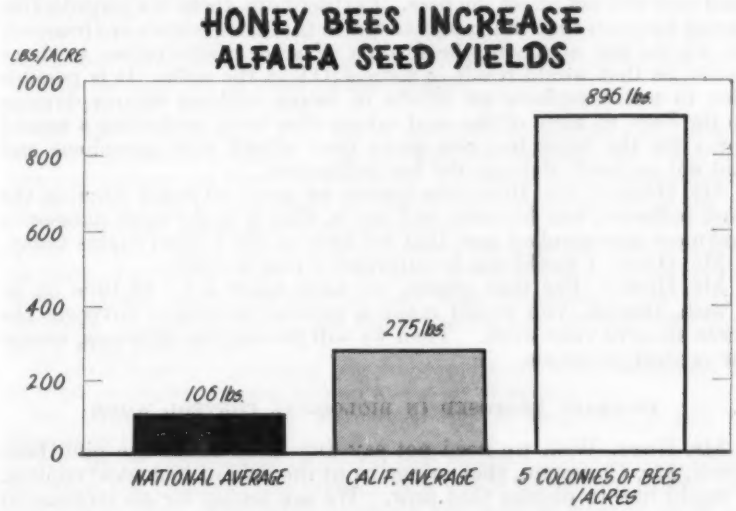
effective in killing the hornfly and are not taken up by the animal and excreted in the milk. They are considered safe sprays.

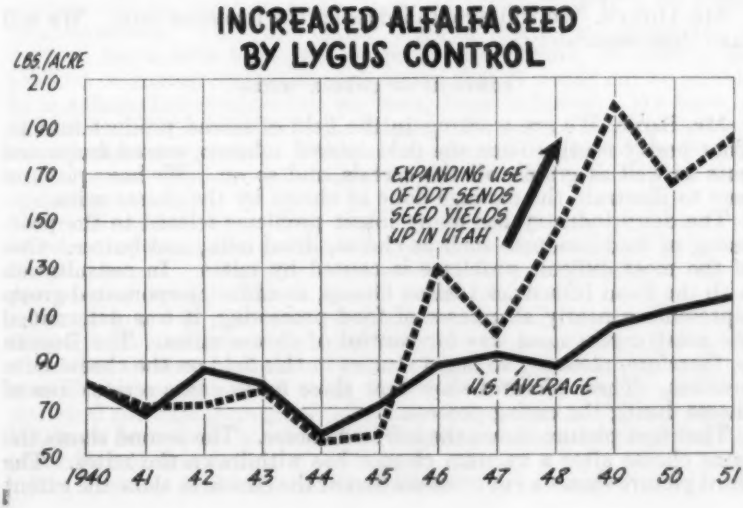
INCREASED ALFALFA PRODUCTION BY HONEYBEES AND LYGUS CONTROL

Mr. HOYT. Then we have two charts concerning alfalfa, one to show the effect of honeybees in increasing the yield of alfalfa seed, and the other to show the increase in production of alfalfa seed by controlling the Lygus bug.

Mr. HORAN. We will also insert these charts.

(Charts referred to are as follows:)





Mr. HOYT. The production of alfalfaseed, cloverseed and a number of other small seeds was reaching the vanishing point in this country because insecticides were destroying all the natural pollinators. It has been discovered now by putting bees in the fields at the rate of 5 colonies of bees to the acre, that they secure a yield as high as almost 900 pounds of alfalfaseed.

Mr. HORAN. While we are on that subject, what insecticides or pesticides are in use now that render alfalfa safe to honey bees?

Dr. BISHOPP. Now, in the case of alfalfaseed production, we advocate the use of a DDT spray prior to the opening of the blossoms. In that way, you can kill the lygus bugs on the alfalfa which are serious seed pest and not affect the bees. Furthermore, there is a considerable period between that time and harvest so that the residues are lessened. So we do not advocate the feeding of seed alfalfa refuse to dairy cattle, as that would result in some DDT in the milk. It is possible also to put toxaphene on alfalfa in bloom without serious damage to the bees, so some of the seed raisers who insist on having a second spray for the lygus bug can spray their alfalfa with toxaphene and still not seriously damage the bee pollinators.

Mr. HORAN. Mr. Hoyt, the reason we spent so much time on the pink bollworm was because, as I see it, that it is the most dangerous and most uncontrolled pest that we have in the United States today.

Mr. HOYT. I would not be surprised if that is correct.

Mr. HORAN. For that reason, we have spent a lot of time on it. I wish, though, you would make a general statement covering the three areas of your work. Then we will go into the increases, except for control programs.

INCREASE PROPOSED IN BIOLOGICAL CONTROL WORK

Mr. HOYT. Well, we need not say any more about the pink bollworm, Mr. Chairman, that brings us to the field of biological control. I would like to discuss that now. We are asking for an increase in funds for biological control.

Mr. HORAN. We will avoid discussing the increases now. We will take those separately.

CONTROL OF CHEESE MITES

Mr. HOYT. We are working in the field of stored product insects. That pretty much covers the field: stored tobacco, stored fruits and nuts as well as grains, all the cereals, and so on. We have pictures here to illustrate the damage done to cheese by the cheese mite.

The dairy industry has many insect problems related to the processing of food products such as cheese, dried milk, and butter. One of the most difficult problems is caused by mites. In consultation with the Food Industries Liaison Group, an industry-sponsored group representing nearly all phases of food processing, it was determined the most urgent need was for control of cheese mites. The Bureau is, therefore, planning to begin studies in this field on the cheese-mite problem. These pictures show how these mites cause serious loss of cheese during the curing process.

That first picture shows the infested cheese. The second shows the same cheese after a vacuum cleaner has withdrawn the mites. The third picture shows a cut cross-section of the cheese to show the extent

the mites had eaten down into the cheese. You can see how this cheese is totally destroyed.

TOBACCO BEETLE CONTROL

This [illustrating] is a hand of flue-cured tobacco. It shows the work of the cigarette beetle.

Mr. HORAN. Where is this tobacco produced?

Mr. HOYT. The flue-cured comes from Tennessee and Virginia and the Carolinas. The cigarette beetle is very destructive and the only method of control that we have now that is effective is through the use of fumigants in tobacco storages.

Mr. HORAN. What type of fumigants?

Mr. HOYT. Mostly cyanide gas. They put the tobacco in an air-tight room and just give it a thorough fuming. Much of this work is done through use of vacuum fumigation.

Mr. HORAN. That is lethal?

Mr. HOYT. Yes, sir. The use of insecticides generally on tobacco presents a residue problem. You cannot use them for the same reason you cannot use them on foodstuff. Tobacco is so easily affected as to flavor that it may easily be ruined for commercial purposes.

Mr. HORAN. Have you tried parathion?

Mr. HOYT. There have been a number of different products tried on these, yes, sir; and we must develop a method of suppressing this insect by an easier and safer process than fumigation. It is very desirable to find an insecticide which can be used with greater flexibility than fumigation.

When a man or a company lets you experiment on a warehouse full of tobacco—tobacco runs into an awful lot of money——

Mr. HORAN. So does a warehouse full of spaghetti if you get weevils in it.

Mr. HOYT. That's true of almost any product under today's prices. So when the industry will furnish us a whole warehouse full of food supplies or other agricultural products, and turn us loose to make any experiments we want to make, they are cooperating to a very substantial extent. They are taking a lot of risk as we might fail to destroy the insects that may be present, or injure, or destroy the product or contaminate it in such a way that it would not be salable. It is substantial cooperation we have, from industry. We have at this time unlimited facilities offered us in the way of material to work on anywhere we want it. I think it speaks very highly of the Bureau workers that industry generally has that much confidence in their operation.

Mr. HERRELL. Something like $30 million worth of tobacco in warehouses was made available for experimentation last year where the people making it available assumed all risks that might arise from our research work. This is merely representative.

Mr. HOYT. On problems of this sort, Mr. Chairman, where the stored products are involved, such as tobacco, grains, dried fruits, and a number of those products, we are frequently asked why it is not possible to make use of some form of electrical impulse, passing electrical currents through or bring them in contact with the products. We have done quite a substantial amount of work investigating the possibility of that field.

Mr. HORAN. And infra-red rays, too?

Mr. HOYT. That kind of thing, yes, sir; the whole field of electrical impulses. As long as 30 years ago I saw a setup where they were treating cigars in a cigar factory with the X-ray. The finished product was stored in a room where they had a whole battery of X-ray machines that treated those cigars under the supervision of a member of the Department of Agriculture to see if it was possible to destroy this same cigarette beetle. Down through the years from that time until now we have tried every sort of an electrical device that has been developed.

They are still making substantial developments in the field of electricity so that we are not ready to write off the possibility of finding some method whereby we could sterilize grain, for instance. It makes a very interesting picture to think of a belt moving a load of grain along with a battery of electrical appliances of some sort playing on it and you pass the sterile grain into the bin. We have not been able to get that.

RESPONSIBILITIES FOR RODENT CONTROL

Mr. HORAN. The biggest problem, I think, is mice in our grain cars right now. What are you doing about rodent control?

Mr. HOYT. We are not in the field of rodent control directly.

Mr. HORAN. Somebody had better go into that field.

Mr. HOYT. That is the responsibility of Fish and Wildlife Service of the Department of the Interior insofar as the Federal Government is concerned.

Mr. HORAN. In our grain industry right now we are having a lot of trouble. Some few rodents get in a carload of grain and it is condemned.

Dr. BISHOPP. A word on that. You may not be aware that the Senate Committee on Agriculture and Forestry has recently held a hearing on this whole subject. You may be interested in reading the transcript of that hearing. It brings out the relation of hidden insect infestations and contamination by rodents, birds, and all that sort of thing.

Mr. HORAN. Mr. Hoyt, what is your relationship with Fish and Wildlife on rodent control? This is a problem that is very much with us.

Mr. HOYT. We have been on a cooperative basis with Fish and Wildlife for a good many years.

Mr. HORAN. What do you mean by "cooperative"?

Mr. HOYT. We have very little to do with the rodent-control problem. Of course, our men are in granaries and storage places and they pass on information of infestation.

Mr. HORAN. Do you think that is good?

Mr. HOYT. The cooperative relationship, you mean?

Mr. HORAN. The fact that we have to depend upon Fish and Wildlife Service to control rodents when you are so close to the commercial transportation of foodstuffs?

Mr. HOYT. I do not know why they are not just as close to it as we are, Mr. Chairman.

Mr. HORAN. They could not possibly be as close to it as you are. Do you think it is good?

Mr. WHITTEN. It is pretty hard, Mr. Chairman, to see how, the major objective of the Fish and Wildlife Service being what it is, how

it could in any way be as important as the food supply of this country with which the Department of Agriculture deals. Rodent control and its effect on a major segment of the whole economy is of such importance that I cannot see why such research would be with the Fish and Wildlife Service.

Mr. HORAN. If we are going to have whole carloads of grain condemned because of inadequate rodent control, we should have the people directly concerned with agriculture working on the problem. We cannot expect a game warden to come out of the hills and inspect carloads of wheat when we have the Bureau of Entomology and Plant Quarantine on the job all the time.

PLANT QUA..ANTINE WORKLOAD

Mr. HOYT. I think I have covered most everything listed here. However, I wanted to bring the attention of the committee to the fact that this entomology and plant quarantine function is a pretty big field. We have discussed the question of the quarantine problem at the outset a little, Mr. Chairman, but we have a chart to show how the workload of the people inspecting incoming materials into this country has increased during the past 10 years. This is a difficult thing to show on a chart because we have so many different kinds of units with which we deal. You see the increase in the first one there, the interceptions of plant material, has increased from 56,000 to 166,000.

Mr. HORAN. In 10 years.

Mr. HOYT. In a 10-year period; yes, sir.

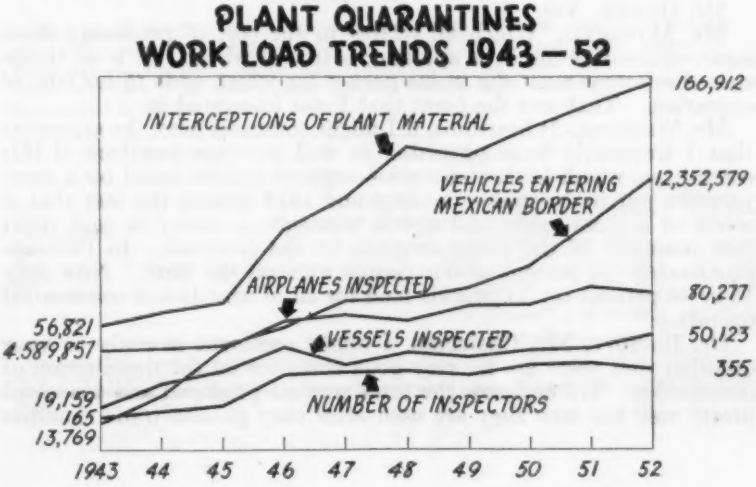
The next line shows the increase during the same period in the number of vehicles crossing the border of Mexico.

Mr. HORAN. Are these both ways?

Mr. HOYT. That is incoming to the United States only. There were four and a half million 10 years ago. Now there are over twelve and a quarter million vehicles a year.

Mr. HORAN. We will insert this chart in the record at this point.

(The chart referred to is as follows:)



Mr. HOYT. There is tremendous traffic across the Canadian border, too. Then that next line shows the airplanes inspected, which has changed from 13,000 10 years ago to 80,000 currently. The next line, which represents vessels inspected, shows 19,000 10 years ago and 50,000 this year. The bottom line shows the number of plant quarantine inspectors handling this work. We had 165 10 years ago; we have 335 now.

PORTS OF ENTRY ON CANADIAN AND MEXICAN BORDERS

Mr. HORAN. Could you supply the number of legal ports of entry that you must watch on the Canadian and Mexican borders. I am not going to ask for seaports, nor airports, because that is a different matter.

Mr. HOYT. We have that available. We will insert it in the record.

(The information requested is as follows:)

The ports of entry on the Canadian border are: Blaine, Wash., Buffalo, Detroit, Niagara Falls, and St. Albans.

The ports of entry on the Mexican border are: Brownsville, Calexico, Dallas, Del Rio, Douglas, Eagle Pass, El Paso, Hidalgo, Laredo, Mercedes, Nogales, Presidio, Roma, San Antonio, and San Ysidro.

EXTENT OF USE OF INSECTICIDES AND PESTICIDES

Mr. MARSHALL. I am wondering if you have any figures that would show about what the average farm in the United States spends on insecticides and pesticides in a year? Could you compare that with a period of, say, 10 years ago? Do you have figures along that line?

Mr. HOYT. I do not know whether we could supply that much, Congressman Marshall. There was a billion pounds of insecticides produced in 1951 but how that was distributed, at this moment I could not answer. We will be glad to assemble as much information on that as we can and we can put it in the record.

Mr. MARSHALL. Is that agreeable?

Mr. HORAN. Yes.

Mr. MARSHALL. Which all relates to the cost of producing these commodities whether it be apples or cotton or wheat. It is all things that the farmer must dig in his pocket for which adds to his cost of operation. That was the point that I was interested in.

Mr. WHITTEN. It bears out, if I might comment here, the argument that I frequently have presented as well as other members of this committee, which is that any price-support system based on a comparative purchasing power in 1909 and 1914 ignores the fact that it refers to a gross figure and now a tremendous outlay in cash must first come out of the dollar received by the producer. In 1909 approximately 85 percent of our people were on the farm. Now only 15 or 16 percent try to provide food for all of us. It is a commercial operation.

Dr. BISHOPP. Mr. Chairman, I might comment in reply to your question that there are no very good statistics on the distribution of insecticides. We do know the total amount produced and processed pretty well but how they are used after they go into trade channels

is very difficult to bring out. I think we can probably get some figures on average consumption on farms of different types in different parts of the country.

Mr. MARSHALL. Include the total amounts used in the country as nearly as you can get it, and also the average amount spent by individual farmers producing selected commodities.

(The information requested is as follows:)

ESTIMATED COST OF INSECTICIDES IN CROP PRODUCTION

The estimated cost of insecticides used in crop production in the United States in 1951 was $300 million as compared with $150 million in 1944. This does not include the cost to the farmer of application. This cost varies widely with the crop but on the average runs from 50 cents to $1 per application and the number of applications varies with the crop and pest involved.

The cost of protecting legumes against alfalfa weevil, lygus, and spittlebug by means of insecticides averages about $3 to $4 per acre. Protecting a potato crop against the Colorado potato beetle and aphids with insecticides costs about $5 to $15 per acre. The control of tobacco insects in the field is approximately the same.

The cost of insecticides and their application to cotton often reaches $20 per acre per season.

Protection of fruit crops such as apples, pears, and cherries is an expensive operation running from $60 to $100 per acre.

INSECT DAMAGE TO STORED GRAIN

Mr. MARSHALL. Since we have lately had considerable discussion in our area about rat damage, I am prompted to ask if you have any figures that would show the total loss in the United States in stored grain due to insect damage.

Dr. BISHOPP. We can supply figures on that, necessarily an estimated loss.

Mr. MARSHALL. If possible, I think that would also be an interesting figure in the record.

Mr. HORAN. Yes, it would.

(The information requested follows:)

STATEMENT OF ANNUAL LOSSES OF SEVEN PRINCIPAL CEREAL GRAINS CAUSED BY STORED GRAIN INSECTS

It is conservatively estimated that stored grain insects destroy 5 percent of the total cereal grain production of the United States each year. Based on the 1952 crop yields these losses would amount to the sums listed below. These losses will vary from area to area but the total loss of 5 percent is considered to be a sound estimate.

Crop	Production [1]	Value [2]	Loss
Corn ..... bushels	3,306,735,000	$5,193,570,000	$259,678,500
Wheat ..... do	1,291,447,000	2,669,275,000	134,963,750
Sorghum grain ..... do	83,316,000	137,313,000	6,865,650
Rice ..... bags	48,690,000	285,865,000	14,293,250
Oats ..... bushels	1,268,280,000	1,064,070,000	53,203,500
Barley ..... do	227,008,000	319,158,000	15,957,900
Rye ..... do	15,910,000	28,233,000	1,411,650
Total	6,241,356,000	9,727,484,000	486,374,200

[1] Acreage, Yield, and Production of Principal Crops, 1952 Annual Summary, Crop Production, BAE, U. S. D. A., December 1952.

[2] Season Average Prices and Value of Production, Principal Crops, 1951 and 1952. Agricultural Prices, BAE, U. S. D. A., Dec. 17, 1952.

Mr. HORAN. In regard to the first increase to strength research, what do you plan to do?

Mr. HOYT. That is to strengthen research on pink bollworm, stored-product insects, and to strengthen research in the field of biological control. These were the three research items in which we are asking for increases. I think the discussion has pointed out the needs in those respective fields.

PLANT QUARANTINES

NEED FOR STRENGTHENING INSPECTION STAFFS AT PORTS OF ENTRY

Mr. HORAN. You have an increase of $100,000 to strengthen inspection at ports of entry. What are your particular problems at the ports of entry?

Mr. HOYT. The increased traffic, the need for manpower to make the inspections to keep up with the volume of business, the presence of destructive insects and plant diseases that might be introduced in the various channels have all brought home the need for continuing our efforts and in many areas we need to strengthen them. It is much more costly to eradicate or control an injurious insect or plant disease once introduced in this country, than it is to take adequate precautions to keep it out in the first instance.

CONTROL OF CITRUS BLACKFLY

For instance, at this time we have been combating in Mexico the citrus blackfly.

Mr. HORAN. You have been doing that for how many years?

Mr. HOYT. For the last several years we have been working on that.

Mr. HORAN. How many years?

Mr. BISHOPP. Five or six years, I would say.

Mr. HORAN. How long have you been fighting the citrus blackfly?

Mr. WHEELER. About 6 years, I believe.

Mr. HOYT. I think, Mr. Chairman, that is not far wrong. We can fix the date in the record.

Mr. HORAN. Would you do that for the record—that work being conducted by Dr. Baker?

Mr. HOYT. Yes, sir; and also through quarantine people along the Mexican border.

Now, there was a serious infestation of the citrus blackfly at Matamoros during the current season.

Mr. HORAN. How far is that from the border?

Mr. HOYT. Across the river from Brownsville, Tex., a distance of a mile, or a mile and a half, or thereabouts. They found infestation there covering a substantial amount of the little city of Matamoros and the Mexicans have permitted us to conduct a spray program there. In fact, they have cooperated in it. We have sprayed several times over the entire area.

Mr. HERRELL. This work has been going on since 1943.

Mr. HOYT. Ten years.

Mr. HERRELL. In research, survey, and suppression methods.

Mr. HOYT. The program was aimed at trying to keep the blackfly from crossing the border and those who know suggest that it has thus far been successful. In the meantime, the introduction of parasites in Mexico which our people did has proved to be very effective so that

with the exception of the border points, we are about through with the spray program in Mexico for blackfly, and are getting good natural control.

COOPERATION WITH MEXICO

Mr. HORAN. When we talk about blackfly, my main interest is to find out what increase there is in the cooperation of the Mexicans and their desire to take care of their own problems. It poses a very, very delicate question and one that must have troubled you.

Mr. HOYT. Cooperation in Mexico has been excellent. The officials of the Department of Agriculture adopted a spray program for Mexican citrus groves. They took steps to raise money which has amounted to about a million dollars per year which they have been spending for the last several years in the actual application of suppressive measures. In the meantime the parasites that we introduced have proved to be so effective that they have taken the spray rigs out of the field and are rearing and distributing parasites and spending their money in that direction now rather than in the chemical control. So that the only points in which we are carrying on a definite suppressive program now are at specific points such as Matamoros and on the far west coast where we are continuing the spray programs at the northernmost points of infestation for the protection of the California-Arizona and Texas citrus interests. We are getting good cooperation under these conditions and I do not know but what we have been getting about all we have the right to expect.

Mr. HORAN. That is one of the factors that is involved in your request for additional inspectors. I am glad to hear your comments because I have been disturbed particularly with the control of blister rust in our white pine in the West. Canada has decided that it would be uneconomic to undertake any control measures. They would rather harvest all of their white pine and abandon that as a crop. We are trying to fight it. We have spent millions of dollars, in fact, in excess of $100 million in fighting aftosa in Mexico and we are fighting citrus blackfly and other diseases in that country; and it does have a bearing on our consideration of these funds.

I am glad to hear you say that in your opinion the Mexicans are increasing their control measures and spending some of their own money on it. It is encouraging to us. They are our neighbors and anything along that line is definitely helpful.

NEED FOR MORE BORDER INSPECTORS

In the light of that, how many new inspectors do you require on the borders?

Mr. HOYT. We want, and I will supply the number in a minute, we want them along the Mexican border. We want them to increase our inspection of incoming airplanes where there has been a good deal of pest risk and at certain of the maritime ports as well. It makes a total of——

Mr. HERRELL. The request is for 16 inspectors in various field points and 1 aid and 1 clerical assistant in the inspection offices in Washington, or a total of 18 additional personnel requested in this increase as full-time personnel.

Mr. HOYT. That involves nine different ports. We can include that list in the record.

(The information referred to is as follows:)

Increases are requested to strengthen inspection work at the following ports: Boston, Mass.; Brownsville, Tex.; El Paso, Tex.; Honolulu, T. H.; Laredo, Tex.; New Orleans, La.; New York, N. Y.; Port Arthur, Tex.; inspection house, Washington, D. C.

Mr. HORAN. Would you increase those at El Paso, Laredo, and Brownsville, Tex.?

Mr. HOYT. Yes, sir.

Mr. HORAN. How about Calexico?

Mr. HOYT. We have not provided for additional help in Calexico. At that point the situation is a little bit different because of the fact that we have the protection given by the lack of contact from the balance of Mexico with that area where the Gulf of Baja California separates it. There is no communication. There are no communicable roads across that, just around the head of that body of water, and we have inspectors stationed at Calexico so that we have good control of the situation, as good as we can get. We think the Lower California area is fairly well protected from pests from the balance of Mexico, so that the Calexico situation up to now is still in pretty good shape. We have not felt the need for more help.

CITRUS BLACKFLY

Mr. HORAN. Your worst infestation of citrus blackfly is just south of that.

Mr. HOYT. Yes; it is at Guaymas, which is about 150 or 200 miles down the Gulf coast there from Nogales. When you get over to Calexico, the nearest infestation there is at La Paz, down the coast about 900 miles.

Mr. HORAN. I have seen that chart. Dr. Baker showed it to us. At New York you have an increasing problem.

Mr. HOYT. Yes, sir; there is a tremendous workload at New York. The maritime ships, the airplanes, the traffic in general through the port of New York is just continually increasing.

Mr. HORAN. Of course, you have some inspectors at Hawaii.

INSPECTORS IN HAWAII

Mr. HOYT. We have a substantial staff of inspectors at Hawaii but considering the number of fruitflies that are there——

Mr. HORAN. How many inspectors do you have there?

Mr. HOYT. There are 42 inspectors there. We have the oriental fruit fly, the Mediterranean fruit fly, and the melon fly, three destructive fruit flies in Hawaii. It is impossible to grow any kind of a fruit in Hawaii with the exception of the pineapple without its being attacked by one or the other of these insects. To keep the produce and the passengers and the traffic from the islands from bringing some or all of those different fruit flies to the mainland we feel justifies and requires the number of men we have doing the inspection work there at Hawaii. They preinspect. The airplanes there are all inspected before departure so that on their arrival on the mainland they do not have to be reinspected.

Mr. HORAN. Industry pays for that in the State of Washington.

Mr. HOYT. I am not sure exactly if I understand what you are talking about. They pay for the re-inspection of Hawaiian commodities?

Mr. HORAN. For the inspection of anything they export.

Mr. HOYT. For export, that is right.

HAWAIIAN INSPECTION

Mr. HORAN. Why do we have to supply free inspection for the Hawaiians?

Mr. HOYT. The Hawaiians have to pay for export certificates the same as you do in Washington or any other State. I think you are talking about the regular grade and quality certificates issued by the Production and Marketing Administration and they are not free. Residents of Washington or other States do not have to pay for sanitary certificates issued by the Bureau of Entomology and Plant Quarantine and the Hawaiians have the same privilege.

Mr. HORAN. How about Boston?

Mr. HOYT. Let me say one word about the Hawaiian situation, if you do not mind, sir. The biggest single item involved in the inspection in Hawaii is passengers' baggage. The passenger traffic is composed primarily of returning visitors. So that we are inspecting our own people and it is easier to get them at the point of loading on the airplane than it is upon arrival on the mainland. It is cheaper to inspect their baggage as they load on the plane rather than do it upon arrival of the plane at this end. Planes do not always land where they are supposed to and people are in a hurry when they get off. They want to get away from there. We think it is a more effective procedure. You were going to ask a question about Boston.

Mr. HORAN. Yes. I think that is a rather expensive operation in Hawaii. I really believe that. I think that further analysis is warranted of those 42 inspectors in Hawaii. That is a lot of inspectors.

Mr. HOYT. Yes, sir; it is but the protection of the mainland from three destructive species of fruit flies fully justifies the effort.

Mr. HORAN. They are knocking on our door to become a State. I voted for their admission as a State but I think that the exporters of fruit should make some new arrangement which would cut down the number of inspectors. That is an enormous number of inspectors, Dr. Bishopp. Certainly a sanitary certificate can be worked out and charged to the exporters of this fruit. We have a double standard in this world. We have one standard for our own people at home and we have another standard for what we allow to be done in other countries and then be shipped to this country and sold.

Mr. HOYT. We must keep in mind, Mr. Chairman, that the United States Department of Agriculture requires these restrictions and it is not something that is sought by Hawaii. Since it is a Federal quarantine it seems to me quite appropriate that the Federal Government should pay for it. By that means the citizen returning from Hawaii is more nearly on a level with one returning to the east from a visit to Washington, Oregon, or California.

With your permission, I would like to add a further statement on this subject for the record here.

Mr. HORAN. That will be satisfactory.

(The information referred to follows:)

Plant Quarantine Activities in the Territory of Hawaii

Following is an explanatory statement concerning the plant quarantine activities in Hawaii. A tabular summary of activities performed by the Plant Quarantine inspectors in the Territory of Hawaii providing information concerning workload appears on page 846.

1. Plant Quarantine inspectors, in clearing foreign planes arriving in Honolulu, and in clearing planes departing for all points on the United States mainland, apply the required insecticidal aerosol spray to protect American agriculture from insect pest introductions.

2. With the exception of a few planes which come from the Orient through Alaska, all military and civilian air traffic from all points west and south of Hawaii, destined to the mainland of the United States, passes through the Territory of Hawaii. To accommodate such traffic 24-hour service is maintained at (1) Hickam Air Force Base, (2) Barbers Point Naval Air Station, and (3) Honolulu International Airport. Any other required 24-hour service is also rendered, but it should be remembered that the greater part of the Hawaiian activities are performed to protect the 48 States of the mainland against pests in Hawaii, which in certain instances were brought into those islands by traffic movement during World War II.

3. Inspectors of the Division supervise fruit treatments at 10 different plants in the islands, as follows: Honolulu, 6; Hilo, 2; Island of Maui, 1; and Island of Kauai, 1. At the present time there is a request for the approval of still another treating plant, which would further increase the workload.

4. The cost of the salary of one inspector in Honolulu is paid for by Australia and New Zealand, under an arrangement made through the Department of State whereby an inspector of the United States Department of Agriculture makes a plant quarantine inspection of planes leaving Honolulu for those two areas in the South Pacific.

A considerable amount of the cost of the work required in the supervision of these plants has been paid for in the manner explained by portions of a letter of February 16, 1953 from Dr. H. H. Warner of the Territorial Government, addressed to the Secretary of Agriculture, which we quote:

"As in any business of packing and shipping perishable fruit, there are occasions when overtime is unavoidable. There is no objection to such duty on the part of the inspectors but under the above ruling the cost of such overtime is charged to the shippers. Aside from the principle involved, which we think is somewhat reprehensible because the inspector is actually a police officer, the shippers object to the payment of such overtime because packers and shippers on the mainland are not assessed such charges. It appears that only in Puerto Rico, Hawaii, etc. can the shippers be compelled to pay for the occasional overtime hours of the inspectors on the somewhat flimsy ground that such shipments are 'imports' to the mainland United States.

"In an honest effort to encourage this industry, the Honolulu Chamber of Commerce absorbed such bills for a while, then they were paid by the Governor's Industrial Research Agricultural Council which is now discontinuing the practice as of March 1. The total cost to all shippers will run only about $7,500 per year and it would seem that the Bureau's budget would allow for enough flexibility to cover this amount. It would not be a continuing item for when statehood is achieved (and it now seems certain), Hawaiian receipts at California ports could hardly be considered 'imports' and shippers here would be on the same basis as shippers in Utah. After all we all pay the same Federal taxes and should be entitled to the same treatment even though Hawaii is not yet the 49th State."

From the above it will be noted that the fruit growers of Hawaii are not without expense in meeting plant quarantine requirements of the mainland of this country, as set forth in the provisions of the Hawaiian Fruit and Vegetable Quarantine, No. 13, which is intended to prevent the introduction of certain serious fruit pests into the mainland from Hawaii.

During the month of February 1953 there were 495 hours of work devoted to supervising fruit sterilization in Hawaii. Any such supervision performed outside of the regular 40-hour week was performed on an overtime reimbursement basis, which was paid by the shippers or others in interest. This is the same practice and operated under the same congressional authority as that followed in providing plant quarantine inspection services on the mainland.

Mr. MARSHALL. You touched on the dairy problem. It is amazing that in the dairy problem we not only have a difference between foreign production and American production, but double standards right within the United States itself.

Mr. HORAN. I don't doubt it at all.

Mr. HOYT. We have a quarantine on Hawaii.

Let us think for a minute. Suppose we put one on the State of Washington. Suppose that a man who goes into the State of Washington has got to have his personal baggage inspected before he can leave there. He sends a Christmas present to somebody. He has to have the package inspected before the post office will accept it. He can't ship a thing that doesn't have the inspection stamp on it to show that there is nothing in the package that is capable of carrying the fruitfly in one form or another. The citizens of Hawaii have paid plenty for the nuisance and the trouble and all the things that go with the imposition of a quarantine. When we put an inspector down there to work a 24-hour day with the 40-hour week it takes on average of 5 men to man 1 station.

Mr. HORAN. Why can't customs men do some of this work?

Mr. HOYT. They can and do. For instance, in our work along the Canadian border, we depend very largely on Customs. There is a number of ports across the Canadian border where we don't have men where work is done for us by Customs. We do not have any men at all.

In Hawaii, in the case of traffic to the mainland Customs is not interested. No other Federal agency is interested. We are stuck with all of it. So, I feel impelled to defend the position in which we are placed by reason of our quarantine on Hawaii. The United States Department of Agriculture has the quarantine and if it should take that quarantine off, we could pull these men off but we believe it is serving a very useful and essential purpose to the mainland.

Dr. BISHOPP. I might make this point, too, that many of these inspectors are necessary because of incoming traffic into Hawaii. That is merely a temporary stopover and then the planes move on so that the Hawaiian people are not concerned, only insofar as the planes might bring insects in on them from the islands to the West. Their exports are relatively small in the agricultural field as you know.

Mr. HORAN. I still think you ought to look into it.

Mr. HOYT. Very good, sir; we will be glad to do it.

Mr. HORAN. The next time you have occasion to visit with the Secretary of Agriculture, would you discuss with him what appears to me, at least, to be too many inspectors at Hawaii?

Mr. HOYT. Yes, sir; I will be delighted.

Mr. HERRELL. Mr. Chairman, I think it would be desirable to put in the record at this point some statistics with respect to our workload in Hawaii. It would give helpful information to the committee concerning the plant quarantine activities there.

(Information referred to is as follows:)

Volume of plant quarantine inspection activities in the Territory of Hawaii, for report year Dec. 1, 1951, to Nov. 30, 1952

	Foreign	Domestic	Mainland departures	Total
Number of ships inspected	1,530			1,530
Number of ships with prohibited material	421			421
Number of planes inspected	7,872	751	9,089	17,712
Number of planes with prohibited plant material				8,729
Pieces of plane baggage inspected	499,182		569,524	1,068,706
Pieces of plane cargo subject to inspection	1,670		44,292	45,962
Hold baggage and auto trunks inspected and sealed		18,425		18,425
Cut flowers and leis inspected and passed		498,685		498,685
Cut flowers and leis inspected and rejected		1,749		1,749
Express packages inspected		2,124		2,124
Mail packages inspected	4,222	191,224		195,446
Mail packages refused entry or rejected	560	322		882
Total mail packages handled	4,222	644,805		649,027
Entries of material under permit-inspection	336			336
Miscellaneous inspections				26,261
Shipments of fruits and vegetables certified after inspection				1,231
Shipments of fruits and vegetables certified after treatment				2,097
Total treatments supervised				1,054
Interceptions of plant material	13,077	4,695		17,772
Number of pest interceptions				1,776
Number of packages treated or cleaned				1,965
Number of export certificates issued				209
Total permits issued authorizing imports of plant material				202
Number of collaborators paid by Hawaii				25

Mr. HORAN. Mr. Taber, they have 42 inspectors in Hawaii and while Mr. Hoyt has done a good job of justifying it, I still think that is too many.

Mr. TABER. Have they got that many now?

Mr. HORAN. Yes, and they want more.

Mr. TABER. What did they have last year?

Mr. HOYT. Forty-two inspectors.

Mr. TABER. What do they do?

Mr. HORAN. They inspect transient fruit, and baskets of fruit that people take on trips. That is the biggest problem, is it not?

Mr. HOYT. Every passenger that leaves Hawaii for the mainland has to be interrogated and if he has any fruit in his baggage, it has to be examined.

Mr. TABER. What sort of insects have you got that bring about that requirement.

Mr. HOYT. We have three fruitflies in Hawaii, the oriental fruitfly, the Mediterranean and the melonfly, so that between them, the three insects attack every fruit that grows with the exception, I think, of the pineapple. So that every person who departs from the Hawaiian Islands is a potential carrier of some infested material. The military planes that travel back and forth between the mainland and Hawaii, they are all inspected before they take off. Our main inspection item is a tremendous thing.

Mr. HERRELL. One item in our explanatory material, Mr. Chairman, that you have placed in the record, makes reference to the disease vectors intercepted in the Hawaiian Islands in the last calendar year. There were thousands of leafhoppers intercepted at Hawaii on a plane from the Fiji Islands which were of a species considered to be the vector of the Fiji disease of sugarcane.

Mr. HORAN. I understand that. Please do not misunderstand me. I am not criticizing the fact that we need inspectors—we do not want to spread these vectors here to the United States. But I am criticizing the system which has apparently removed any responsibility from those who are in the industry over there. I can't understand yet why I, as a fruit producer in the State of Washington, am required to have a sanitary certificate or its equivalent before I can get a bill of lading of a carload of fruit out of the State of Washington. That means that if anybody wants to take any fruit from me, it is already State and federally inspected for which I have paid.

Mr. HOYT. Anyone who ships any fruit out of the Hawaiian Islands has to have it treated which means fumigation or some other treatment under the supervision of the inspector and he has to have the same type of a certificate.

Mr. HORAN. In Wenatchee, Wash., if you wanted to sell gift boxes of fruit which a person could take aboard a plane headed for Hawaii, at one time at least and I think it is still true, I would have to supply a certificate of sanitation for that before I could sell it. Part of the cost of producing that package would be for that. Presumably any customs inspector that could read could say that has been cleared and the person could go abroad ship.

I have asked you to talk this over with Secretary Benson because 42 inspectors is a lot for the Hawaiian Islands and you still want more.

QUARANTINE NEEDS AT PORT ARTHUR, TEX.

Now, you want some at Port Arthur, Tex., in addition to that?

Mr. HOYT. Yes, sir. We want additional inspectors at a number of additional ports and one of them is Port Arthur where we need one. The traffic in and out of Port Arthur has been increasing. It is an oil port and ships come in there from all parts of the world to take on oil, and to discharge various items of cargo and it is an area in which the establishment of new pests can take place 11½ months out of the year.

Mr. HORAN. Is that a 24-hour port?

Mr. HOYT. No, we are on duty there the same hours that the Public Health is, from sunrise to sunset. This is mostly an inspection of maritime ships that come in there.

QUARANTINE NEEDS AT WASHINGTON, D. C.

Mr. HORAN. You want some more in Washington, D. C.?

Mr. HOYT. In Washington, D. C., it is to take care of the increased traffic that we handle through the inspection house here. You see, we have the responsibility by way of an understanding with the District of Columbia government where they don't have any inspectors and we do the normal inspection work for the District. We certify material leaving the District for other States and inspect material coming into the District from other States.

PERSONNEL IN WASHINGTON, D. C.

Mr. TABER. How much payroll do you have in the District of Columbia?

Mr. HERRELL. We have in the District of Columbia, including our inspection house, 238 people as of December 31.

Mr. TABER. How many outside?

Mr. HERRELL. There were 1,862 full-time employees on that date. In addition to that, we employ part-time workers in the seasonal operations of the Bureau and there more than 1,200 collaborators, most of whom receive no pay. That includes not only the research and quarantine work but also control work.

Mr. TABER. Are the ones in the District of Columbia experimental workers or are they statisticians and that sort of thing?

Mr. HERRELL. Practically all of our research divisions are headquartered in Washington and the heads of those divisions are scientists. Some of their work is done at the Beltsville Research Center. Each division headquarters office has about two professional researchers—entomologists, chemists, taxonomists and so on, heading up the work most of which is done at field laboratories. All of our identification-of-insect work is done here. Our National survey to detect the occurrence and degree of infestation of insects is headquartered here, as are our quarantine and administrative activities.

Mr. HORAN. I would like to have you, Mr. Hoyt, discuss this whole business of inspection with the Secretary and after you have done that, if he wants to consult with this subcommittee in any way, I wish that you would suggest that he do so.

PEST RISKS ON THE BORDERS

Mr. HOYT. We have recognized very great difference in pest risk as between the Canadian border and Mexican border. You only have to look at the comparison of the number of inspectors that we have on the one place as compared with the other. We have more inspectors at one port on the Mexican border than we have in the whole of the Canadian border. But to say that a custom inspector or immigration sinpector can inspect a plant that somebody is carrying across from Canada, you have got to get a different kind of immigration inspector to do it.

Mr. HORAN. Not if he is required to have a sanitary certificate by the producer.

Mr. HOYT. You would take the other fellow's word for it?

Mr. HORAN. He has a sanitary certificate which the producer has paid for.

Mr. HOYT. We are talking about the producer now and the citizen from another country.

Mr. HORAN. I do not want double standards. I want my people to get just as good treatment as anyone else.

Mr. HOYT. Would you be willing to see us accept a certificate of inspection from the other country on incoming products?

Mr. HORAN. If you knew what that inspection was.

QUARANTINE INSPECTION AT POST OFFICES

Mr. MARSHALL. In the St. Paul post office you have an inspection officer; it is amazing to see how many things are found, but it always left a question in my mind as to just how successful you were in things that were never uncovered that did go through.

Mr. HOYT. We never will go as far as we would like, Mr. Marshall. The man who is inspecting the mail at an important postal office like

St. Paul, has got to do it more or less on a sample basis. One man can't possibly inspect the flow of material through that post office so that the ones we know about are the ones he intercepts. The ones he may miss, we will never know about unless somebody finds the infestation later on.

Mr. MARSHALL. With that being an admitted possibility, might there not be some merit particularly with Hawaii that Mr. Horan has been talking about of passing back upon the shipper a responsibility which at the present time he does not now have. He has been in the position of pushing some of the costs that might have rightfully been his over on to the Federal Government.

Mr. HOYT. I do not think that is right. I do not agree with you folks on that. On that Hawaiian situation the man who wants to ship a commercial shipment of any kind of produce to the States has got to take it down and have it fumigated. There is nothing that goes out of there, practically nothing that is not certified on the basis of fumigation. He pays for the cost of that fumigation so that he has a responsibility and he cannot escape that responsibility because he has got to take his product out of the island on a ship or airplane and as we have inspectors at both, his material would not be passed.

Mr. MARSHALL. That part I understand. But let us take the next step, for example. I am in the Hawaiian Islands and I want to bring some fruit back with me. Why should it not be possible for me to assume the responsibility myself of purchasing a product which is stamped as acceptable for shipment. When I step on to that plane, the ticket taker or somebody checks to see if that is stamped "acceptable." It seems to me as though it might be probably too simple a solution.

Mr. HOYT. Yes. You are putting a little too much faith, I think, in human nature. A man visits Hawaii. He visits somebody he knows. They have a guava tree growing there, and he likes the taste, he takes a couple of fruits in his bag. He has forgotten that when the time comes to inspect the bag. He comes along and the inspector says, "Have you got any fruits or plants with you?" "No." "Would you mind opening your bag, we had better take a look." When the guavas are found he is surprised because he had forgotten about those guavas, anyway there are just a couple of them.

But you can find as many as 20 or more fruitfly larva in one of those fruits. I do not know how in the world you can expect the average citizen to take such fruit and go down somewhere and get it inspected beforehand and you would not get it done on the Mainland, either. People do not work that way.

Mr. HORAN. To begin with, it is not done in the State of Washington.

Dr. CLARKSON. On this point that he is mentioning, the normal flow of traffic, human nature being what it is, these things happen a thousand times a day at all our large ports and if there is not someone there with this immediate responsibility and this knowledge that goes with it, of the problems of agriculture whether it be animal industry or plant industry, these things are going to come through in much larger volume than they do now with our protection. We cannot catch all of them by any means, but we certainly are able by these

devices to minimize the danger. I would like to comment on another point, Mr. Chairman.

One of the reasons the Bureau of Animal Industry is able to give, in some instances, what appears to be a more economical service is that they do not have anybody at that port. They are relying on the man from the Bureau of Entomology and Plant Quarantine. That is done in many many places where BAI has nobody but they have a working arrangement with these people that they do in fact take care of the problems of import. So that we have done a good deal along the same line that you have been suggesting that we do toward coordinating and avoiding the duplication of services.

Mr. HORAN. We understand the problems involved here. We think that this subcommittee under the leadership of our former chairman, Mr. Whitten, did a conscientious job in looking into them. There are no personalities involved whatever. It is a difficult problem. We are trying to help out, and I would like to see if we cannot work out some procedures that will increase our traffic across borders and if possible not increase the cost.

RESEARCH PROJECTS FINANCED BY OTHER AGENCIES

What research projects do you handle by transfer of funds or by reimbursement?

Dr. BISHOPP. The principal one that we are doing on a transfer of funds is a job for the Defense Department, involving about $500,000 to $600,000. That deals with the development of methods of controlling insects of military importance, that is, those that may carry diseases to our troops, those that infest military equipment and supplies and those that attack military establishments, buildings themselves. That is our principal work for other agencies by transfer of funds.

Mr. HORAN. Do you personally consider that important work?

Dr. BISHOPP. Very important.

ADMINISTRATIVE AND INFORMATION FUNCTIONS

Mr. HORAN. You have 97 people under the Assistant Chief for Administration and 19 people in the Information Division. Will you discuss their work for the record?

Mr. HERRELL. I will be glad to furnish a statement covering the functions of those groups.

(The statement referred to is as follows:)

ADMINISTRATIVE ACTIVITIES OF THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

The administrative staff of the Bureau of Entomology and Plant Quarantine headquartered in Washington, D. C., is composed of 97 personnel. This staff is divided into four administrative divisions, and includes the employees responsible for this function as a part of the Office of the Chief of Bureau.

A general picture of the administrative work of the Bureau may be observed from the following facts. The Bureau employs approximately 2,200 full-time and from 500 to 1,500 part-time employees located in about 400 individual laboratories and offices in 46 States and in about 25 such locations in possessions, Territories, and foreign countries. These employees use some 80,000 items of nonexpendable property valued at more than $5 million. Federally owned real estate acquired by the Bureau for offices, inspection houses, laboratories, fumigation houses, and insectaries cost approximately $1 million.

In addition to the paid employees listed above. there are about 1,200 collaborators in research, quarantine, and control programs, most of whom assist on a nonpay status, but for whom records of their appointments as collaborators, audit of occasional travel, expense, and other administrative functions are performed.

The Bureau's budget, including direct appropriations, allotments from departmental appropriations, working funds, and contributed funds approximates more than $15 million a year which is budgeted in approximately 500 individual salary and miscellaneous station expense accounts. To meet quarterly apportionment requirements this means more than 2,000 individual budget adjustments during a year.

The Washington staff is responsible for four major functions:

1. Serving the Bureau employees headquartered in Washington, Beltsville, and foreign countries, totaling 355 as of December 31, 1952.

2. Prescribing policies and procedures, delegating authority, and checking on the use of such authority by the five regional administrative offices and similar offices in the territories.

3. Assembling, analyzing, and reporting personnel, financial, property, and other record information to the Bureau of the Budget, Treasury, Civil Service Commission and Congress, and for other administrative purposes.

4. Serving as advisory staff in program planning and execution to insure compliance with the Government laws, rules, and regulations.

The work of this staff is analyzed quarterly in relation to plans for that quarter and the development of plans for subsequent quarters. Adjustments in personnel to meet these requirements are made as the workload requires and permits.

In line with the suggestions of the House Appropriations Committee, as a result of their recent study of the work of the Bureau, the administrative work has been considerably adjusted and strengthened to insure the availability of full and current information in the Washington office concerning field activities.

The following examples are representative of some of the work of this staff either directly by them or by the administrative divisions in the field under the general direction and guidance of the Washington staff during the fiscal year 1952:

1. To comply with the requirements issued pursuant to Public Law 253, requiring the audit of at least one-third of the positions in each agency each year, 597 positions in the Bureau were reviewed—370 of these by desk-audit and 227 on the basis of information supplied by the employee and concurred in by his supervisor. (The program was not begun at the beginning of the year and hence the full quota was not met.) Each audit requires considerable time to permit the employee adequately to describe the functions assigned to him and to review with the supervisor the part played by the employee, his relationship to others in the organization, contacts with the public, and general responsibilities.

2. Individual records of approximately 2,200 full-time employees were written, checked, and distributed to conform with the requirements of Public Law 429, Classification Act of 1949.

3. Individual card records were established at five regional offices for 80,646 items of nonexpendable property valued at $5,849,063, to comply with regulations issued by the General Services Administration pursuant to Public Law 152, dated July 1, 1949. This card record was established concurrently with the general plan to strengthen the Bureau's equipment management functions, and, through the general reorganization of this work, property excess to the needs of certain stations, having a value of $288,000, was transferred to other Bureau locations having a need for the equipment.

4. There were 54 consolidations of office space, 63 leases were terminated, and 16 new leases negotiated to permit general improvement in the housing conditions for the Bureau's field activities. Net savings resulting from such revised housing plans approximated $65,000.

5. A total of 3,500 cubic feet of useless records (occupying the equivalent of 2,333 letter-size file drawers) were disposed of during the year. A saving of more than $12,000 was released for 192 four-drawer steel file cases and 768 transfer cases through utilization of equipment made available by disposition of these useless records.

6. An improved system for the clearance and release of administrative procedures and policies was developed and installed. One of the principal factors of the system was to see that the instructions were sent only to those concerned with the subject matter.

7. A procedure was established to comply with the limitations on annual leave prescribed by the Independent Offices Appropriation Act of 1953 which necessitated a separate checking on individual records of approximately 2,200 full-

time employees and from 500 to 1,500 temporary employees 3 times during the year (at the beginning and end of the calendar year leave period and as of June 30, 1953) to determine the leave status.

Some representative indicators of the workload related to the Bureau's administrative job in Washington and the field follow:

Number of personnel actions processed (appointments, terminations, reassignments, retirements, etc.)	2,950
Number of purchase transactions	22,230
Number of vouchers (nonpayroll) processed	49,500
Estimated number of allotment ledger postings	307,000
Average number of persons payrolled biweekly	2,967
Etimated annual number of change slips (change in biweekly pay)	23,800
Number of postings on individual pay cards	309,500
Value of property disposed of (acquisition value)	$482,294
Division or project file manuals prepared	21
Program stations serviced with administrative issuances	376
Automotive units on which detailed reports summarized	2,112
Estimated number of pages of administrative procedures and circulars cleared, stenciled, and distributed	650

This Division of Information is concerned with getting research results into the hands of the public that can make use of this knowledge. The Division employs 19 persons, and consists of the Office of the Division Leader and 3 sections: (1) current information section, (2) editorial section, and (3) the visual aid section.

It is the responsibility of this Division (1) to see that the result from the research of the Bureau's scientists is put before the people that can make use of it in a timely, easily understood way; (2) to keep the Bureau's administrators and the research division leaders advised concerning research information programs and policies; (3) to prepare special reports, speeches, and articles; and (4) to promote and maintain cooperative information relationships with other governmental agencies and with industrial groups concerned with entomological research.

During the fiscal year 1952 the Division edited 3 circulars, 3 farmers' bulletins, 1 handbook, 6 leaflets, 2 program aids, 2 service and regulatory announcements, and 2 technical bulletins for publication by the Department; 35 processed Bureau publications; and 312 manuscripts for publication in outside journals.

An intensified publications program is contemplated for 1954 if funds are available. Partial program plans contemplate the publication of the following material: 15 farmers bulletins, 30 leaflets, 5 home and garden bulletins, 5 program aids, 2 handbooks, 4 circulars, and 3 technical bulletins, as well as the revision of about 10 farmers bulletins and 10 leaflets. The material published by the Bureau consists of reports of research and experimentation for specialists and research workers as well as various popular publications on the control of insects or plant diseases. Typical titles of these publications are The Red Spider on Cotton and How to Control It, How to Fight the Chinch Bug, Domestic Mosquitoes, Preventing Damage to Buildings by Subterranean Termites.

In addition there are a number of processed publications issued by the Bureau. These include three series giving information of a more or less temporary nature on research and control problems, and a weekly report of insect surveys.

In the conduct of its work this Division employs a division leader, 2 information specialists, 1 visual information specialist, 3 writers, 5 technical editors, 4 editorial clerks, 1 illustrator, and 2 secretaries.

FILM AND MOTION PICTURE PRODUCTION

Mr. HORAN. What films or motion pictures do you prepare and what was the cost of production?

Mr. HOYT. We have films on quite a substantial number of the more important economic pests. We could put a list of those in the record.

(The list referred to follows:)

Record of active motion-picture films

Subject	Date of issue	Cost including prints	Number of showings, 1952
Realm of the Honey Bee	1932	[1]	302
Horses and Bots	1933	[1]	52
Mosquito—The Public Enemy	1935	$162	221
Revision of above in 1944		[1]	260
Cicada	1937	[1]	65
Revision of above in 1939		[1]	110
Block That Termite	1940	289	490
White Pine Blister Rust	1942	7,355	233
The European Corn Borer	1948	2,862	513
Five Bandits of the Cotton Crop	1948	1,066	275
Blister Rust—Enemy of Pines	1948	6,799	[2] 50
Our White Pine Heritage	1948	6,669	[2] 32
Paul Bunyan Had a Son	1948	8,151	[2] 35
Return of the Pines	1948	6,816	[2] 28
A Destructive Invader	1949	6,201	[2] 26
King of the Soft Woods	1949	7,317	[3]
Stem Rust	1950	12,592	244
Your Enemy—Grasshopper	1951	13,733	[3]

[1] No record.
[2] Partial use record only.
[3] No record available.

The films are as a rule deposited in State college libraries and made available on request. Those concerned with white pine blister rust have been extensively employed as a visual training aid in the control program on this disease.

LEGAL AUTHORITY

Mr. HORAN. Is your basic legal authority under which you are operating mandatory or just permissive?

Mr. HOYT. Our basic legal authority under which we operate in the quarantine field is mandatory. Our other authority is permissive.

Mr. HORAN. Mr. Hoyt, this has been a good hearing. I hope we have all benefited from our discussion.

We will adjourn until tomorrow morning.

LIST OF WITNESSES

	Page
Bates, F. D., Jr	437
Beach, V. H	706
Bishopp, Dr. F. C	796
Brown, Walworth	362
Butler, K. A	492
Byerly, Dr. T. C	492
Clarkson, Dr. M. R	437, 460, 492, 591, 646, 706, 796
Coons, Dr. C. M	460
Crow, W. C	285
Cullinan, Dr. F. P	706
Donovan, H. A	646
Elting, Dr. E. C	362
Herrell, H. G	796
Hilbert, Dr. G. E	646
Hodgson, Dr. R. E	591
Holm, Dr. G. E	591
Hoyt, A. S	796
Huneke, Miss Cecelia	460
Irving, Dr. G. W., Jr	646
Kirkham, M. M	591
Knoblauch, Dr. H. C	362
Lennartson, R. W	285
Matchett, Dr. J. R	646
McPhee, Dr. H. C	492
Mick, Dr. A. H	362
Miller, Dr. A. R	492
Moseman, Dr. A. H	706
O'Brien, Dr. Ruth	460
Parker, Dr. F. W	706
Popham, Dr. W. L	796
Quisenberry, Dr. K. S	437, 706
Reed, Dr. O. E	591
Roberts, R. S	219, 285, 362, 437, 460, 492, 591, 706, 796
Scott, Dr. W. M	646
Shaw, Dr. B. T	219, 285, 362
Simms, Dr. B. T	492
Speh, C. F	437
Spencer, F. H	219
Stiebeling, Dr. H. K	460
Struttmann, E. L	219, 285, 437
Syfrig, Mrs. M. W	796
Trelogan, Dr. H. C	285
Walsh, R. M	285
Wells, O. V	285
Wheeler, J. C	219, 646

INDEX

A

	Page
Agricultural and Industrial Chemistry, Bureau of	646
Achievements, examples of	681
Animal fats, new uses for	659, 667, 672
Apple concentrates	663
Authority for	706
Cotton and wool fibers, research on utilization of	658, 679, 694
Dried egg program	676, 686
Food and feed preservation	700
Orange juice, powdered	665, 685
Patents issued to the Bureau	662, 668
Personnel	703
Potatoes, surplus, utilization	674
Research contracts	691
Salaries and expenses	646
State experimental stations, cooperation with	670
Stretch bandage	666
Surpluses reduction through dehydration and concentration of foods	689
Vegetable oils	687
Agricultural Marketing Act	285
Economists	358
Farm prices	298
Increases in appropriations and estimates, application of	353
Market data, collection, analysis, and dissemination of	333
Advisory committees	338
Consumer preference and trade acceptance studies	335
Contracts, work under	336
Marketing costs, margins and efficiency	305, 308
Market organization and facilities, improvements in	317
Handling methods and equipment, improving of	325
Retailing, reducing the costs of	329
Terminal market facilities, improving of	318
Transportation research	332
Personal services	356
Product quality, improvement and evaluation of	306, 311
Projects, analysis of	353
Wage and freight rates in agricultural marketing	299
Agricultural Research Administration	219
Administrator, Office of the	270
Administrative management unit	280
Agricultural research center, multiple-purpose buildings and improvements	275
Allotments and transfers	278
Business services unit	282
Information office	279
Appropriations for ARA by constituent agencies	247
Areas needing increased research	258
Central office project	257
Corn production per acre	225
Cotton production per acre	235
Duplication in research program	254
Egg production per layer, United States average	222
Farm housing research	260
Industry, research in	242
Investment in principal field of agricultural research	243

Agricultural Research Administration—Continued	Page
Milk production per cow	233
Organizational structure of	251
Population growth, relation of research needs to	265
Pork production per hundred pounds of feed	229
Potato production per acre	231
Programs, coordination of	252
Progress through research program	221
Research funds:	
Federal and non-Federal sources, distribution between	245
Percentage distribution of	246
Requirements for program	254
Research line projects, new and discontinued	247
Salaries and expenses	270
Soils and fertilizer research, coordination of	255
Stockpiling of food	266
Wheat production per acre	237
Animal Industry, Bureau of	492
Animal disease control and eradication:	
Authority for	551
Cattle fever ticks along international border of Texas, control of	539, 572
Hog cholera vaccines, supervision of production of	575
Inspection service at sea and airports	574
Mexican border inspection	539, 572
Scabies eradication in Louisiana and Mississippi	570
Scrapie disease of sheep	550
Tuberculosis and brucellosis	523, 533
Vesicular exanthema	389, 540, 543
Cost of program	543, 565
Animal research:	
Animal husbandry	527
Federal and State contributions to	565
Forage, utilization of	556
Poultry and swine, diseases of	500, 526, 560, 567
Field organization	535
Foot-and-mouth disease and other contagious diseases of animals and poultry	578
Authority for	588
Mexico, status of foot-and-mouth disease in	584
Functions of	525
Information Division	544
Livestock in agricultural economy, importance of	518
Livestock research, expenditures for	564
Meat consumption per capita	519
Meat imports and exports, analysis of	520
Meat inspection	577
Obligations, statement of	518
Other agencies, work performed for	543
Personnel Division	546
Salaries and expenses	492

D

Dairy Industry, Bureau of	591
Administration, functions of personnel in	643
Authority for	644
Breeder's associations and land-grant colleges, cooperation with	634
Cheese:	
Methods of making various types of cheese, development of better	622, 638
Packaging and cheesemaking research, participation of industry in	639
Dairy herd improvement:	
Investigations Division, report of study of mechanization	599
Program	627
Hybrid cow development, progress in	641
Industry assistance, comparison with	611

Dairy Industry, Bureau of—Continued Page
Industry research on dairy product utilization 637
Information Division, function of 642
Machines, office, inventory of 644
Milk:
Consumption per capita 624
Fluid distribution problems 605
Nonfat solids, demand and tests for 596, 616
Production costs 635
Production per cow 233
Whole milk consumption, encouragement of 606
Price supports 611
Process Butter Act, administration and enforcement of 641
Proved sire records, data included in 633, 645
Receipts and expenditures 642
Research organizations, cooperation with 618
Salaries and expenses 591

E

Entomology and Plant Quarantine, Bureau of 796
Administrative functions 850
Alfalfa production, increase by honeybee and lygus control 833
Beef production, increase through fly control 832
Biological control of insects and noxious weeds 817, 834
Cotton production, increase by early community control 830
Film and motion picture production 852
Information Division 852
Insecticides 816, 819, 838
Milk production, increase through fly control 832
Pink bollworm, problem of 820, 825
Plant quarantines 840
Inspection staffs at ports of entry, strengthening of 840
Workload trends, 1943–52 837
Research and control programs, relationships between 822
Salaries and expenses 796
Stored products insects 817, 839
Experiment Stations, Office of 362
Acts for Federal grants, provisions of 380
Alaska, research on agricultural problems of 418
Agricultural development, problems in 428
Cabins, research on experimental 435
Efficiency of production, increases in 431
Population trends 430, 434
Results of research 422
Authority for 375
Automobiles 436
Diseases of animals, needed research on 389
Forage crops research in 394
Payments to States, Hawaii, Alaska, and Puerto Rico 362
Redistribution of funds 382
Research, funds for 384
Salaries and expenses 400
Virgin Islands agricultural program 407

F

Farm prices 298

H

Human Nutrition and Home Economics, Bureau of 460
Authority for 474
Bread, calcium and milk content of 483
Contract research 486
Economists 490
Family food expenditures as related to income 484
4-H Club accomplishments 476
Home economists using research findings 479

Human Nutrition and Home Economics, Bureau of—Continued Page
Increases requested, purpose of 480, 488
Information Division, structure and activities of 474
Personnel, increases for 488
Potatoes, studies on 482
Publications 471
Salaries and expenses 460

M

Meat consumption per capita 519

P

Plant Industry, Soils, and Agricultural Engineering, Bureau of 706
Agricultural engineering investigations 778
Authority for 794
Crop yields, increases in 751
Field crop investigations 738, 755
Emphasis placed on program, sufficiency of 738
Forage crop production, breeding, disease, and quality investigation 748
Personnel 755
Rubber production, breeding, and disease investigations 743
Tobacco research in Wisconsin 754
Wheat rusts, control of 744
Forest disease investigations 762
Horticultural crop investigations 759
Citrus diseases 759, 760
Orlando, Fla., citrus laboratory 759, 761
Information Division 793
Losses from diseases and annual cost of research 752
National Arboretum 785
Personnel, administrative 794
Salaries and expenses 706
Soils, fertilizers, and irrigation agriculture investigations 765
Conservation practices, value in relation to increased yield 776
Distribution of program by geographic areas 770
Fertility of soil, trend of 774
Personnel 774
Soils, fertilizers and management, influence on nutritional value of plants 765
State agricultural experiment stations, cooperation with 741

S

Strategic and critical agricultural materials, research on 437
Fats and oils, vegetable, investigations on 452, 454
Fiber plants, investigations on 456
Other departments, research by 453
Rubber, natural, research on domestic production of 442
Tannins, vegetable, investigations of domestic production of 451

W

Wage and freight rates in agricultural marketing 299

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